This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

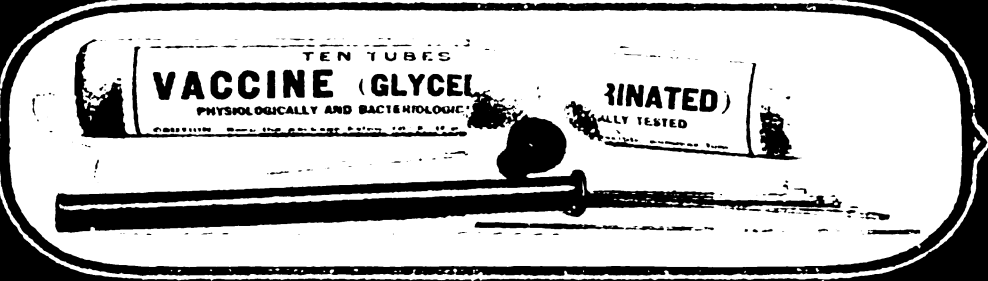
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

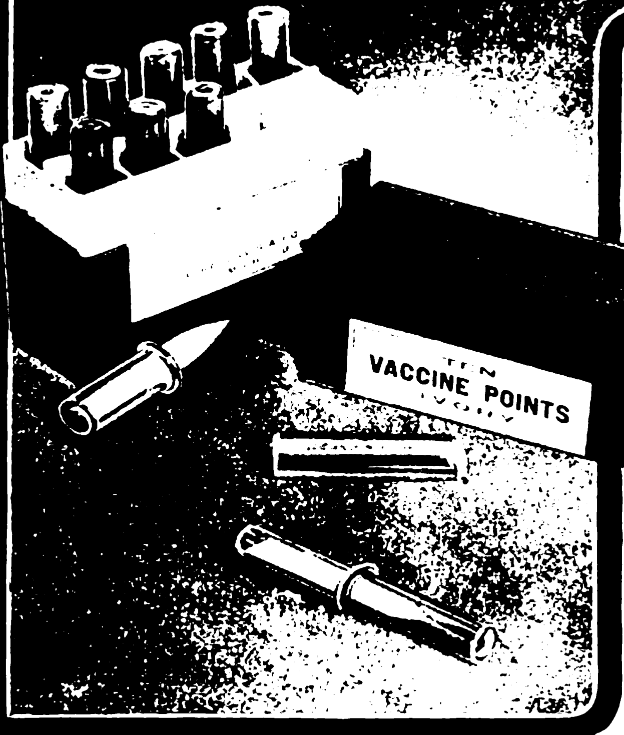
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

VACCINE
(GLYCERINATED)
BACTERIOLOGICALLY & PHYSIOLOGICALLY TESTED





THE FAVORITE VACCINE
. . OF THE . .
MEDICAL PROFESSION

Parke, Davis & Co.'s Glycerinated Virus is active. It is free from taint of sepsis. It is preferred by physicians to any other vaccine.

PRICES:

Capillary Glass Tubes (hermetically sealed), per box of ten, *60 cents;* per box of three, *20 cents;* **Points** (each in a Lee's patent breakable glass tube),

ANY
OW, ENG.
EANS, KANSAS
AL, QUE.;
PAN.

Pharmaceutical review

Frederick Hoffmann, Edward Kremers

3 2044 106 390 255

4TO

LIBRARY OF
50
ECONOMIC BOTANY

JUL 1 195

Pharmaceutical Review.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.

EDITED BY
DR. EDWARD KREMERS.

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI, JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Physiologist in charge of Drugs and Medicinal Plants, Division of Agriculture, Washington, D. C.

VOL. XXII.

MILWAUKEE,
Pharmaceutical Publishing Co.
1904.

22 E 7
11-11

TABLE OF CONTENTS.

Editorial.

Page.
Scientific tendencies in pharmacy.. 1
Finances of the A. Ph. A..41, 81, 121, 317
Whence the present U. S. Pharmacopœia came........................ 43
Charles Rice... 161
"The patent medicine curse".. 161
Affiliation of C. P. of the City of N. Y. with Columbia.................. 163
Kansas City meeting of the A. Ph. A.................................277, 317
    Commercial Section.. 321
    Historical Section.. 322
    Scientific Section.. 325
    Section on Education and Legislation............................... 329
    Section on Practical Pharmacy and Dispensing....................... 333
American Conference of Pharmaceutical Faculties......................... 337
Association of American Boards of Pharmacy.............................. 339
Louisiana Purchase Exposition..341, 397
The prerequisite clause and the 12 Regents' counts...................... 487
The prerequisite requirement and the Ohio Board......................... 488

Contributions.

In aid of the study of the history of materia medica, medicine and chemistry. By *Fr. Hoffmann*.. 5
History of Echinacea angustifolia. By *J. U. Lloyd*........................ 9
The citral assay of volatile oils. By *E. Kremers* and *I. W. Brandel*...15, 72
The proposed volatile oils of the U. S. P., 1900. By *Edward Kremers*, ...25, 96, 146, 214
Pharmaceutical legislation in New York during the early seventies........ ....31, 155, 198, 219
The sesquiterpenes. By *Oswald Schreiner*............................60, 101, 131
The international atomic weights. By *A. B. Lyons*........................ 86
A simple quantitative determination of formaldehyde and paraformaldehyde. By *Clemens Kleber*.. 94

Damiana (The Mexican tea), Turnera aphrodisiaca. By *J. U. Lloyd*.... 126
An American pine tar oil. By *Edward Kremers*.... 150
The volatile oil of Monarda citriodora. By *I. W. Brandel*.... 153
Progress in alkaloidal chemistry during the year 1903. By *H. M. Gordin*.... 167, 204, 256
Phytochemical notes. By *Edward Kremers*.... 183, 298
Oxydase from Monarda fistulosa. By *Frank Rabak*.... 190
The thermal death point of the Monarda ferments. By *D. B. Swingle*.. 193
Volatile oil constituents of the Swedish and Belgian pharmacopœias..... 195
The nestor of Chicago pharmacy: Ezekil Herbert Sargent. By *Albert E. Ebert*.... 201
New remedies, organic and inorganic.... 231, 274
Drugs of primitive peoples.... 241, 279
$\Delta^{1\cdot 4}$ Terpadiene-3-oxime-6-one (Nitroso carvacrol). By *E. Kremers* and *I. W. Brandel*.... 248, 290
Proposed changes in the U. S. P.—Amyl nitrite. By *I. W. Brandel*....... 269
Oregon Balsam. By *Frank Rabak*.... 293
Drugs used by North American Indians.... 300
Acetic acid extracts. By *A. R. L. Dohme*.... 345
The determination of codeine in opium. By *Charles E. Caspari*.... 348
Pharmaceutical journals. By *H. P. Hynson*.... 353
The study of phytochemistry. By *Edward Kremers*.... 353, 394, 462
The founding of the Lloyd Library. By *J. U. Lloyd*.... 357
The deficiency in the supply of assistant pharmacists and the necessity for a longer probationary period. By *J. H. Beal*.... 361
Notes on certain reactions of the cinchona alkaloids. By *A. B. Lyons*.... 365, 446
The use of potassium bi-iodate for standardizing volumetric solutions. By *Charles E. Caspari*.... 371
Balsam copaiba. By *A. R. L. Dohme* and *H. Engelhardt*.... 376
Report on the examination of some official drugs. By *Daniel Base*....... 389
American pharmaceutical colleges and schools. By *Wilbur Scoville*...402, 455
On abietene. By *W. T. Wenzell*.... 408
The oxymethyl-anthraquinone drugs and their assay. By *A. Tschirch*.415, 447
The cultivation of the opium poppy and the production of opium in the U. S. By *W. O. Richtmann*.... 426
Historical fragments. By *Edward Kremers*.... 427
Practical versus theoretical mathematics in gas analysis. By *A. B. Lyons*.... 440
Practical as well as theoretical mathematics in gas analysis. By *I. W. Brandel*.... 445

Books Reviewed.

Arnold, C.: Repetitorium der Chemie ... 116
Barber, J., and *V. Schestauber:* Buchführung im Apothekerbetrieb ... 308
Beckurts, H., and *G. Frerichs:* Jahresbericht der Pharmacie ... 306
Bocquillon-Limousin, H.: Formulaire des médicaments nouveaux pour 1904 ... 118
Bulletin of the New York Botanical Garden ... 307
Clarke, F. W., and *L. M. Dennis:* Elementary chemistry ... 239
Crinon, C.: Revue des médicaments nouveaux et de quelques médications nouvelles ... 239
Dannemann, Fr.: Grundriss einer Geschichte der Naturwissenschaften ... 117
Engler, A.: Syllabus der Pflanzenfamilien ... 471
Era Druggists Directory ... 240
Getman, F. H.: Laboratory exercises in physical chemistry ... 470
Goris, A.: Recherches microchimiques sur quelques glucosides et quelques tannins végétaux ... 238
Humphrey, J.: The Pharmaceutical Journal formulary ... 309
Just, A.: Die analytischen Reactionen der technisch wichtigsten Elemente ... 307
Koller, Th. — Chas. Salter: Cosmetics ... 118
Lassar-Cohn—Tingle: Application of some general reactions to the investigations of organic chemistry ... 474
Lippmann, E. O. v.: Die Chemie der Zuckerarten ... 471
Maiden, J. H.: A critical revision of the genus Eucalyptus ... 471
Memminger, A.: Quantitative analysis brief ... 476
Meyer, H. — J. B. Tingle: Determination of radicles in carbon compounds ... 120
Ostwald, W.: Grundlinien der organischen Chemie ... 233
Pax, F.: Prantls Lehrbuch der Botanik ... 306
Pictet, A. — A. C. Biddle: The vegetable alkaloids ... 312
Prescher, J. — V. Rabs: Hilfsbuch für das Apothekerlaboratorium ... 237
Schimpf, H. W.: A text-book of volumetric analysis ... 116
Schelenz, H.: Geschichte der Pharmacie ... 467

INDEX OF AUTHORS.

Page.
Allen, Chas. E., 307
Base, Daniel, 389
Beal. J. H., 361
Brandel, I. W., 15, 72, 153, 237, 248, 269, 290, 471
Caspari, Charles E., 348, 371
Chamberlain, F. H., 15
Daniells, W. W., 239, 476
Denniston, R. H 471
Dohme, A. R. L., 345, 376
Ebert, Albert E., 201
Engelhardt, H. 376
Gordin, H. M., 167, 204, 256
Hoffmann, Fr., 5, 116, 306, 467
Holden, M. I., 152
Hynson, H. P., 353
Kleber, Clemens, 94
Kremers, E., 1, 15, 25, 31, 41, 43, 72, 81, 91, 116, 117, 118, 120, 121, 146, 150, 155, 161, 163, 183, 198, 214, 219, 231, 233, 238, 239, 240, 241, 248, 274, 277, 279, 290, 293, 300, 306, 307, 308, 309, 312, 317, 321, 337, 339, 341, 355, 394, 437, 472, 475, 476
Lloyd, J. U., 9, 121, 357
Lyons, A. B., 86, 365
Rabak, Frank 190, 293, 440, 446
Richtmann, W. O 426
Scoville, W 402, 455
Schreiner, O., 60, 101, 131
Stevens, A. B 415
Swingle, D. B., 193
Tschirch, A 415
Wenzell, W. T 408

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.

EDITED BY
DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 1. JANUARY, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

LIBRARY OF SCIENCE
BOTANICAL MUSEUM

TABLE OF CONTENTS.

Editorial 1

In aid of the study of the history of Materia Medica, medicine and chemistry. By *Fr. Hoffmann* 5

History of Echinacea Angustifolia. By *John Uri Lloyd* 9

The citral assay of volatile oils. By *E. Kremers* and *I. W. Brandel* 13

The proposed volatile oils of the U. S. P. 1900. By *E. Kremers* 25

Pharmaceutical legislation in New York in the early seventies 31

Concentrationen oder Resineide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

ADNEPHRIN SOLUTION

(1:1000)

A Stable and Most Effective Solution of the Pure Chloride of the Adrenal Active Principle.

The active principle of the adrenals, discovered by Abel, is the most powerful hemostatic and astringent known. Adnephrin Solution is undoubtedly the best preparation of this valuable principle, possessing, as it does, a high degree of activity and being so peculiarly stable that it is far less likely to turn pink — showing deterioration — than most solutions of the kind with which druggists are acquainted.

Adnephrin Solution is physiologically standardized and is uniform and correct in every particular. It is being extensively advertised to physicians and will surely have a large sale — **and every dollar's worth will be sold by retail druggists.**

Sixty cents per oz. — of jobbers or direct.

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

FREDERICK STEARNS & CO.,
DETROIT, MICH., U. S. A.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,

DIPLOMA OF HONOR, FIRST PRIZE.

Hygienic Exhibition, Berlin, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

International Exhibition, Barcelona, 1889.
GOLD MEDAL.

Teplitz, 1879,
LARGE GOLD MEDAL.,

Amsterdam, 1889,
LARGE GOLD MEDAL.

Moscow, 1872,
LARGE GOLD MEDAL.

Vienna, 1873.
MEDAL OF PROGRESS.

Vienna, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

ANUSOL SUPPOSITORIES

CURE HEMORRHOIDS RELIEVE CONSTIPATION

COMFORTING AND CURATIVE — SWIFT, SURE AND SAFE

THE BEST OF ALL REMEDIES

BECAUSE THE MOST EFFECTIVE

THAT'S THE REASON THEY SELL SO WELL

YOU WILL NEVER REGRET KEEPING THEM IN STOCK

A PROFIT BRINGING REMEDY OF RENOWN

OF ANY WHOLESALER

SCHERING & GLATZ 58 MAIDEN LANE, NEW YORK

SOLE AGENTS FOR U. S. AND CANADA

Tonic Beef
S.&D.
A PALATABLE PREDIGESTED READILY ASSIMILABLE NUTRITIVE TONIC & FOOD.
DOSE
FOR ADULTS, HALF TO ONE TABLESPOONFUL EVERY FOUR HOURS AND AT BED TIME. FOR INFANTS AND CHILDREN TEN DROPS TO A TEASPOONFUL ACCORDING TO AGE
MANUFACTURED ONLY BY
SHARP & DOHME
BALTIMORE.

TYPHOID

FEVER PATIENTS
THRIVE BEST ON

TONIC BEEF

BEEF, WHEAT AND EGGS

Predigested — Palatable — Nutritious
In 14 Oz. Bottles

MADE ONLY BY

SHARP & DOHME

Baltimore
St. Louis New Orleans Chicago
New York

ACETONESULPHITE

RESTRAINER
Saves Over-Exposures
of any Degree.

SUBSTITUTE
for the
Sulphites.

PRESERVATIVE
Keeps Fixing Baths
Clear and Stable for Weeks.

EDINOL

Best All-Around Developer
for Plates, Paper, etc.
Never Fogs or Stains.

PHOTOGRAPHIC PRODUCTS
BAYER
40 Stone St.
New York.
FARBENFABRIKEN OF ELBERFELD CO.

FLASHLIGHT

Practically no Smoke or Dust.
Safe. Efficient.
Strongest Actinity.

INTENSIFIER

Works in one Solution,
Which can be used Repeatedly;
Keeps Indefinitely.

FIXING SALT

A Rapid Working Acid Fixing Bath;
Clear and Effective
After Weeks of Use.

Selling Agents for the United States and Canada
FARBENFABRIKEN OF ELBERFELD CO., 40 Stone St., New York.

Trade also Supplied by

EDWARD H. BUEHLER,
134 Lake St., Chicago, Ill.

DOMINION DYEWOOD & CHEMICAL CO.,
Toronto, Ont., Canada.

OCCIDENTAL SUPPLY CO.,
131 Second St.,
San Francisco, Cal.

For Sale by All Dealers in Photographic Supplies and Wholesale Druggists.

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.

(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach. Pleasant in taste and readily assimilated.

* * *

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

DOSE
FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

* * *

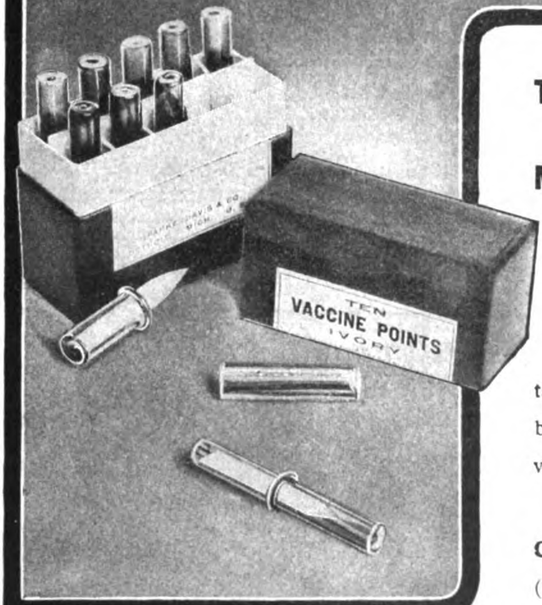
KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**

VACCINE

(GLYCERINATED)

BACTERIOLOGICALLY & PHYSIOLOGICALLY TESTED



THE FAVORITE VACCINE
.. OF THE ..
MEDICAL PROFESSION

Parke, Davis & Co.'s Glycerinated Virus is active. It is free from taint of sepsis. It is preferred by physicians to any other vaccine.

PRICES:

Capillary Glass Tubes (hermetically sealed), per box of ten, *60 cents;* per box of three, *20 cents;* **Points** (each in a Lee's patent breakable glass tube), per box of ten, *60 cents.*

LET US HAVE YOUR ORDER NOW.

PARKE, DAVIS & COMPANY

LABORATORIES: DETROIT, MICH., U.S.A.; WALKERVILLE, ONT.; HOUNSLOW, ENG.

BRANCHES: NEW YORK, CHICAGO, ST. LOUIS, BOSTON, BALTIMORE, NEW ORLEANS, KANSAS CITY, MINNEAPOLIS, INDIANAPOLIS, MEMPHIS; LONDON, ENG.; MONTREAL, QUE.; SYDNEY, N.S.W.; ST. PETERSBURG, RUSSIA; SIMLA, INDIA; TOKIO, JAPAN.

Pharmaceutical Review.

Volume 22. JANUARY, 1904. Number 1.

Editorial.

Less than a generation ago, there were exceedingly few persons in this country with a thoroughly scientific training who devoted practically all of their time and energy to pharmaceutical education. To-day there is not only a goodly number of such persons, but the American Conference of Pharmaceutical Faculties at its last meeting had the pleasure of welcoming several scientists to its sessions who had no special pharmaceutical training, but whose university positions caused them to be interested in pharmaceutical education. Not only have the colleges of pharmacy realized the fact that drug store experience is not necessarily the best preparation for a professorship, but the universities are beginning to recognize that the several pharmaceutical branches can be and ought to be taught in harmony with the best methods of up-to-date scientific instruction.

Nothing marks more clearly the difference between the present Conference of Pharmaceutical Faculties and its forerunner of several decades ago, than the present and past attitude toward scientific pharmaceutical instruction. It is true that a few remnants of the past still manifest themselves here and there. Thus, for example, a professor of practical pharmacy at an Eastern college is requested to move along because he has served as long as his predecessors and should, therefore, give some one else a chance. In addition to the application of the rule of spoils, it is claimed that he his too theoretical. It is sufficient to add that the college in question is not distant from one of the oldest universities of the country, an institution that has long given instruction in theology, law and medicine; also has adapted itself to modern needs of instruction in engineering, but has never recognized its duty to establish a pharmaceutical curriculum.

That our educational institutions should have recognized the necessity of making their courses more and more scientific, may be regarded lightly by many pharmacists, for such a change was naturally to be expected on the part of those already scientifically inclined. Ten and fifteen years ago our manufacturing establishments had but little use for the scientific man. The great change which has taken place in this respect can possibly not be emphasized more strongly than by pointing to the fact that of the twenty-five members of the present Committee of Revision of the U. S. P., three are like wise members of manufacturing firms: Dr. A. R. L. Dohme of Sharpe and Dohme, Dr. A. B. Lyons of Nelson and Baker and Dr. E. H. Squibb of Squibb and Sons. These men were not elected in order to give to manufacturers as a class their due representation on the committee, but primarily because of their fitness to conduct scientific research in their specialties.

The fact that other firms are not represented on the Committee of Revision by no means indicates their backwardness in the appreciation of science. The largest pharmaceutical firm e. g. is not thus represented though it employes the largest staff of college and university men. The past year has witnessed the dedication to pharmaceutical manufacturing of a "Science Hall" that would be a credit to any one of our large universities. We take particular pleasure in calling attention to this institution at this time because it was erected under the management of a man who himself had not enjoyed a college education. Many a tribute has been paid to the genial character and lovable nature of the late William M. Warren. We are far from wishing to underrate the esteem in which he was held by his fellow men, but the scientific journal may be pardoned for pointing out at this time that his more lasting influence lay in the "far sighted vision" with which he recognized the possibilities of science and made science contribute her all to the alleviation of pain of suffering mankind. The greatest tribute paid to the man is possibly the claim that he gave the greatest freedom to his editors while some, who profess to lead pharmaceutical thought unselfishly, wanted their pen silenced; but the magnificent "Science Hall" on the banks of the Detroit river will be a monument to his keen judgment as long as its solid walls last.

Dr. Pritchett, President, not of a classical college, but of one of the largest college of applied science in this country, has recently returned from a trip to Europe. If newspaper reports be true he has a high opinion of German engineering and of applied science in general in the fatherland. The supremacy of the Germans in the lines pointed out by Dr. Pritchett are due, he says, to their former appreciation of abstract science. The remarkable success which has accompanied the application of high grade science to chemical manufacturing and engineering has opened the eyes of men engaged in other persuits. How pharmaceutical manufacturing has been quick to learn the lesson has already pointed out. To-day the pharmaceutical schools are often following the manufacturer whereas they ought to lead invariably.

With such a state of affairs, it is rather surprising that a pharmaceutical editor should make the old time mistake of regarding the scientist as a man who sits down placidly in his study in order to construct a new profession of pharmacy. To call attention to mistakes and to point to the proper ultimate solution of problems now confronting us is neither pessimism nor air castle science. To hint that the editor of a pharmaceutical journal is in all probability wrong because he is a scientist may appeal to the pharmaceutical rabble that does not scruple to sell adulterated goods, but this old time argument no longer works with the twentieth century pharmacist who has visited one of our modern manufacturing plants and has marveled at the revolution science has accomplished in his profession.

The state boards of pharmacy as a class are outgrowing their infancy. They are learning how to learn from each other and the pharmaceutical graduate is no longer the *horribile dictu* of their examinations. With them the quintessence of pharmaceutical science is no longer enclosed between the two covers of a quiz compend. The Conference of State Boards, to be organized next summer, will no doubt, accomplish much if properly managed. If it hopes to accomplish much, science will have to be its watchword.

If in place of quiz-compend ignorance and experience in selling side lines, a thorough scientific foundation had been demanded of candidates coming up for examination during the past quarter of a century there would not be as many drug stores to-day. and druggists would find time as well as he able to test the purity of the drugs they dispense. We do not take a pessimistic view of the present situation because druggists have sold their birth right even if we have the courage to call attention to the fact. When a contemporary, that has found fault with us for being too scientific and even pessimistic, within a month of its criticism, finds that the sale of adultered and inferior drugs is "shamefully prevalent" and that "the present campaign of inspection and disclosure is only a step in the elimination of evils the removal of which will mark the inauguration of a new era in pharmacy," we feel that our campaign of education to call a spade a spade is already productive of results.

We never had any desire to "drown half" of our pharmaceutical brethren, but we trust that our state boards will in the near future apply such a dose of pharmaceutical science to the candidates who present themselves for examination. that only the very best may enter the ranks of our calling. The next twenty-five years will then witness a wholesome decrease in the ratio of drugstores to population without working more than a temporary hardship to present proprietors in the greater difficulty of securing cheap clerks who may soon become cheap competitors.

No, we are anything but pessimistic. While others ridiculed science, we have gladly served at her shrine. Now that the value of science is recognized even by the foremost of business men we have even the optimism to look hopefully into the future. We believe that the time is coming when the scientific knowledge demanded by our future state boards will make impossible on the one hand such head lines as "no more apothecary murders"; and on the other will make it possible for the American pharmacist to eke out a respectable living without selling his birthright to the greatest substitutor of all, the manufacturer of the secret nostrum.

In Aid of the Study of the History of Materia Medica. Medicine and Chemistry.

By *Fr. Hoffmann.*

Students and investigators in the realm of the history of pharmacy and medicine, of drugs and spices have, no doubt, experienced perplexing difficulties when they came to make a proper selection from the great mass of literature of all ages pertaining to these subjects. At times it is even difficult to obtain a correct estimate of their relative value and usefulness as works of reference.

As in all literature, succeding authors have more or less drawn upon the writings of preceding generations and the intrinsic value of the accumulated bibliographic stock of consecutive centuries, which is largely apocryphal, is to some extent doubtful. It requires, therefore, critical inquiry, intelligent discrimination and considerable time to obtain due familiarity with the precise value and authority, or the want of such, of the respective works. For this reason it may not be amiss to offer some guidance to those who are about to spend time and energy in searching voluminous libraries and catalogues, by offering a brief list of select works for reliable reference.

LIST I comprises a selection of works replete with bibliographic references and comments, also with biographic information and notes; LIST II a number of miscellaneous works relating to the subject of the respective sciences in general and to the history of organic materia medica, medicine, pharmacy and chemistry in particular.

These works afford a comprehensive survey of the pertaining literature from antiquity to modern times and offer valuable information conducive to the ready and proper choice of the literary resources best suited for historical research and study in the respective domains of knowledge.

LIST I.

(In chronological order.)

KURT SPRENGEL, Versuch einer pragmatischen Geschichte der Arzneikunde. 4 Vols. Halle, 1792—1799.—4th Edition. Leipzig, 1846.

T. F. GMELIN, Geschichte der Chemie bis an's Ende des 18. Jahrhunderts. 3 Vols. Göttingen, 1797—1799.

Ludwig Choulant, Handbuch der Bücherkunde für die ältere Medicin, zur Kenntniss der griechischen, lateinischen und arabischen Schriften im ärztlichen Fache und zur bibliographischen Unterscheidung ihrer verschiedenen Ausgaben, Uebersetzungen und Erläuterungen. Leipzig, 1828.

2d enlarged Edition under the title: Geschichte der Literatur der älteren Medicin. Leipzig, 1841.

A. C. P Callisen, Medicinisches Schriftsteller-Lexicon der jetzt lebenden Aerzte, Naturforscher, Apotheker etc. aller gebildeten Völker. 33 Vols. Kopenhagen and Altona, 1830—1845.

Replete with details concerning the literature of medicine, materia medica and natural sciences.

J. C. Poggendorff, Bibliographisch-literarisches Handwörterbuch zur Geschichte der exacten Wissenschaften, enthaltend Nachweisungen über Lebensverhältnisse und Leistungen der Naturforscher aller Völker und Zeiten. 4 Vols. Leipzig, 1858—1863.

H. C. Bolton, A select bibliography of Chemistry from the year 1492 to 1892. Washington, D. C., 1893. — Supplement, 1899.

LIST II.

E. F. R. Rosenmüller, Handbuch der biblischen Alterthumskunde. 4 Vols. Leipzig, 1830—1831.

Vol. I, pp. 1—347. Description of the minerals and the plants of the Bible.

Lassen, Indische Alterthumskunde. 5 Vols. Bonn, 1847.

2d Edition. Leipzig, 1858—1862.

Möhsen, Geschichte der Wissenschaften. 4 Vols. 1810.

Whewell, History of the inductive sciences from the earliest to the present time. 3d Edition. 3 Vols. London, 1857.

* * *

A. H. L. Heeren, Ideen über die Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt. 2 Vols. Göttingen, 1793—1796.

W. Heyd, Geschichte des Levante Handels im Mittelalter. 2 Vols. Stuttgart, 1879.

I. C. **Wiegleb**, Geschichte des Wachsthums und der Erfindungen in der Chemie in der ältesten und mittleren Zeit. 2 Vols. Berlin, 1790—1791.

I. C. **Wiegleb**, Geschichte des Wachsthums und der Erfindungen in der Chemie in der neueren Zeit. Berlin, 1790 bis 1791.

J. **Beckmann**, Beiträge zur Geschichte der Erfindungen. 4 Vols. Leipzig, 1780—1803.

J. **Beckmann**, A History of Inventions, Discoveries and Origins, translated from the German by **Wm. Johnston**. 2. Vols. London.

H. **Haeser**, Lehrbuch der Geschichte der Medicin. 3. Vols. Jena, 1852. 3d Edition. 1875—1882.

Replete with historical and bibliographic references and notes.

J. F. **Royle**, Essay on the antiquity of Hindoo medicine. London, 1837.

J. G. **Royle**, Das Alterthum der indischen Medicin. Uebersetzt von **Wallach** und **Haessinger**. Cassel, 1839.

Wüstenfeld, Geschichte der arabischen Aerzte und Naturforscher. Göttingen, 1840.

Wüstenfeld, Die Geschichtsschreiber der Araber und ihre Werke. Göttingen, 1862.

A. **Philippe**, Histoire des apothicaires chez les principaux peuples du monde depuis les temps les plus reculés jusq' à nos jours. Paris, 1853.

Philippe and Ludwig, Geschichte der Apotheker bei den wichtigsten Völkern der Erde. 2d Edition. Jena, 1858.

Replete with biographical and bibliographical notes and comments.

J. **Berendes**, Die Pharmacie bei den alten Kulturvölkern. 2 Vols. Halle, 1891.

* * *

Dioscorides, De Materia Medica libri quinque. **Kühn's** Collectio. Vol. 25. Edited by **Curtius Sprengel**. Leipzig, 1829.

C. H. **Pfaff**, System der Materia Medica. 7 Vols. Leipzig, 1818—1824.

Replete with references to earlier works and writings. Vol. 1, pp. 28—41, contains a list of the pertinent literature of the 18th century.

F. A. FLUECKIGER AND DANIEL HANBURY, Pharmacographia. London, 1879.

F. A. FLUECKIGER, Pharmacognosie des Pflanzenreichs. 3d Edition. Berlin, 1891.

Both these works contain abundant bibliographical references and in an appendix a list of earlier writers.

E. GILDEMEISTER AND FR. HOFFMANN, Die aetherischen Oele. Berlin, 1899.

Replete with historical and biographical notes and references.

FERD. HOEFER, Histoire de la Chemie depuis les temps les plus reculés jusqu' à notre époque. 2 Vols. Paris, 1869.

HERMANN KOPP, Geschichte der Chemie. 4 Vols. Braunschweig, 1843—1847.

E. VON MEYER, Geschichte der Chemie. 2nd Edition. Leipzig, 1895.

CHR. G. SCHMIEDER, Geschichte der Alchemie. Halle, 1832.

* * *

THEOPHRASTUS, De historia plantarum libri decem. Editio Wimmer. Lipsiae, 1854.

BALFOUR, The plants of the Bible. London, 1885.

WOENIG, Die Pflanzen des alten Aegyptens. Leipzig, 1886.

BRETSCHNEIDER, On the study and value of Chinese botanical works. Foochow, 1870.

PRITZEL, Thesaurus literaturæ botanicæ omnium gentium. Leipzig, 1872.

Contains on pp. 378—396 and p. 416 a list of the earlier American botanical literature.

HEHN, Kulturpflanzen und Hausthiere in ihrem Uebergange aus Asien nach Griechenland und Italien. 3d Edition. Berlin, 1877.

KURT SPRENGEL, Geschichte der Botanik. 2 Vols. Leipzig, 1817.

MEYER, Geschichte der Botanik. 4 Vols. Königsberg, 1854 bis 1857.

History of Echinacea Angustifola.*

By *John Uri Lloyd.*

This drug, which has slowly wedged its way into attention, is persistently forcing itself into conspicuity. The probabilities are that in a time to come, it will be ardently sought and widely used, for it is not one of the multitude that have flashed into sight, been artfully pushed, then investigated, found wanting, and next dropped out of sight and out of mind. It seems proper, then, that the history of this drug should be recorded in an authoritative way where it can be referred to in a time to come, and that this record is appropriate to the section on historical pharmacy of our Association seems rational. And it also seems consistent that the record should be made in a familiar and discursive manner, rather than stiff and precise.

For sixteen years preceding 1885, Dr. H. C. F. Meyers of Pawnee City, Nebraska, prepared a secret remedy, which he called "Meyer's Blood Purifier". He was an enthusiast in the belief that this remedy was a cure-all for any and all diseases dependent upon depraved blood. He was an empiricist, and commended his blood purifier without reserve in such affections as seemed in its sphere. In 1885, the doctor conceived the idea of enlarging its field of usefulness, and at the same time profiting by the returns from his discovery. He therefore wrote to Professor John King of Cincinnati and to myself, describing his blood purifier, stating that its value depended upon a western plant unknown to medicine, and that he would like to introduce the remedy to physicians generally. He cited many cases where his remedy had effected cures of Rattle Snake bite, depraved blood affections, etc., etc., stating that "In more than six hundred cases, this remedy has failed not once to cure. It is not a poison, the medicament acts on blood and nerve." (Extract from letter.)

The letter head of Dr. Meyer heralded the remedy in conspicuous type, as follows:

Office of
H. C. F. MEYER, M. D.,
Manufacturer and Proprietor of
Meyer's Blood Purifier,
Pawnee City, Neb.

---

* Read at the Mackinac meeting of the A. Ph. A.

Meyer's

BLOOD PURIFIER.

DIRECTIONS.

Take one ounce three times every day in the following cases: — ***Rheumatism, Sick Headache, Erysipelas, Dyspepsia, old Sores and Biles, open Wounds, Dizziness, Scrofula and Sore Eyes.***

In cases of ***Poisoning by Herbs, &c.***, take the double dosis, and ***Bites of Rattlesnakes*** take three ounces three times a day, until the swelling is gone. This is an absolute cure within 24 hours.

Children under 10 years of age half an ounce three times a day.

Meyer's

Blut-Reiniger.

Gebrauchs-Anweiſung.

Man nehme dreimal täglich eine Unze in folgenden Fällen: **Rheumatismus, Neuralgia, krankhafte Kopfſchmerzen, Rothlauf, Dyspepſia, alte Geſchwülſte und Geſchwüre, offene Wunden, Schwindel, Skropheln** und **ſchlimme Augen.**

Bei **Vergiftungen durch Kräuter** ꝛc. nehme man die doppelte Doſis.—Bei **Biſſen von Klapperſchlangen** iſt die dreifache Doſis zu nehmen, und wird innerhalb 24 Stunden die Kur unbedingt bewerkſtelligt.

Kinder unter 10 Jahren erhalten die Hälfte.

Price $1.25 per bottle.

—*Prepared by*—

H. C. F. MEYER,

2255 Jackson Street, St. Louis, Mo.

Professor King consulted me concerning the subject, the supposition being that, as usual, the preparation would be found either to contain some well known drug, or to be an exaggeration. However, as was our custom with all others concerned in Materia Medica directions, we wrote Dr. Meyer to the effect that if his remedy was to be introduced to the medical profession through the Eclectic school of medicine, according to the inexorable rule of our school, the botanical name of the drug would necessarily have to be made public. Neither of us could concern ourselves in the matter unless he was willing to do this. Dr. Meyers then forwarded Dr. King and myself specimens of the root, which to me was new. On May 26th, 1886, I wrote him that I could not from that root fragment determine the matter, and that he would have to supply me a botanical specimen of the plant. Under date of June 7th, 1886, through McCullah and Graham, Druggists, Pawnee City, Nebraska, he sent me a box of the root, which, however, naturally, did not give me an opportunity to classify the plant. On writing to him to this effect, he next, September 28th, 1886, mailed me the whole plant, which Mr. C. G. Lloyd identified as *Echinacea angustifolia*, or the "Nigger Head" of the West. Owing to the close relationship between this plant and the well known *Echinacea purpureum*, or Black Sampson, long used in domestic medicine and familiar to Eclectics and herbalists, I did not seriously consider the drug as one promising to fulfil Dr. Meyers' anticipations. However, Dr. King, with his usual thoughtfulness, consideration, and care, proposed to investigate the matter, and from the drug forwarded me by Dr. Meyers I at once made for Dr. King several specimens of liquid preparations, and then I passed the subject from mind as one among a multitude of such before me, destined to remain in obscurity.

After some months, Professor King informed me that he was very favorably impressed with the action of the preparations made for him, and advised that the remedy be placed in the hands of other physicians of experience in whom he had confidence, and to whom he wrote. Accordingly, I placed the preparation that Dr. King preferred, in the hands of Professor I. J. M. Goss, M. D., of Atlanta, Ga., Professor H. T. Webster, M. D., of Oakland, Cal., and others, who investigated the remedy after the suggestions of Dr. Meyer and Professor King. and if I mistake not, Dr. Meyer also corresponded with these gentlemen.

Two years after the beginning of the investigation, Professor King, in the 1887 E. M. Journal, p. 209, wrote an article on the therapy of the drug Echinacea, which was the first published reference thereto, and this was followed by an article by Professor Goss. When Professor Webster's work on Dynamical Therapeutics appeared, he gave Echinacea considerable conspicuity, which was the first authentic attention received by this plant in a book under covers. These works by professional men of distinction led to attention from Eclectic physicians, their contributions to Eclectic Literature becoming frequent. From this date, the name and claims and uses of the remedy crept gradually outside of our school.

In 1893, Mr. C. G. Lloyd contributed to the Eclectic Annual, p. 332, an article on the drug and its identification, for many persons were then confusing *Echanicea purpureum* with *Echinacea angustifolia*. All of this time, I was rather resisting the claims made by the enthusiastic friends of *Echinacea angustifolia*, believing that conservatism is to be preferred to over enthusiasm, and yet one conspicuous object lesson before me in its early history led me to be more tolerant in its behalf than otherwise I might have been. The wife of Professor King had long since been attacked by a cancer, and Professor King had tried every remedy that he could think of as a palliator, and at last turned to the preparations of Echinacea, which, as claimed by both, Mrs. King and himself, gave her the only relief she had obtained. According to Professor King, it retarded the progress of the enemy as no other remedy had done. For years she had suffered with this cancer, and informed me herself that when Echinacea was not used, she noticed an immediate change for the worse. To such an extent did she believe in the use of Echinacea, that on her account alone, before the remedy was known to others, I made it a duty to keep a constant supply on hand, and to the day of her death she could not do without Echinacea. That it palliated this individual case I had no doubt, and this personal instance, as I have said, removed my prejudice and led me to a much greater toleration for other statements. And yet, the record of the overly famed Sarsaparilla, Stillingia, and such, were ever in mind.

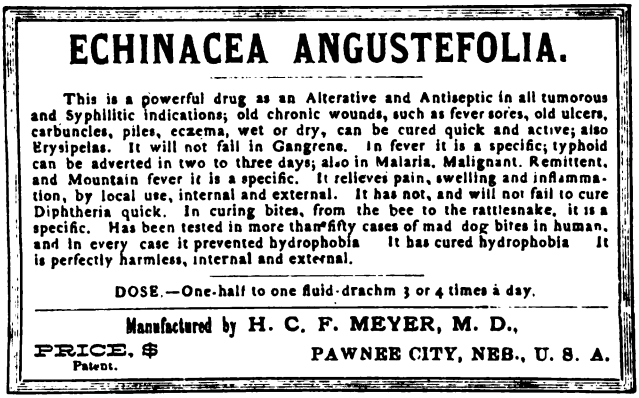
In this connection it may be stated that Dr. Meyer was so positive that Echinacea was a certain cure for the bites of poisonous insects and rabid animals, as to lead him to desire to give the profession an exhibition of its power in that direction. For this purpose, he proposed to come to Cincinnati, and if we could not get a vicious rattlesnake in this locality, to bring a supply of serpents with him, and then, in the presence of selected medical authorities, permit these serpents to bite him freely, when they were in unquestionable condition, and then to counteract the poison by the use of Echinacea, internally and externally. He urged that this be done, which course, however, Professor King and myself positively refused to sanction. Dr. Meyer however claimed that he had been bitten repeatedly, nnd that there was no danger.

From the dates given, the drug Echinacea gradually crept into notice, and now, after nearly twenty years have passed since the investigations were instituted, the drug is becoming conspicuous with the profession, and I will add that, in my opinion, it is destined to become more so.

Owing to the resemblance of the flower heads of *Echinacea angustifolia*, "Nigger Head," to *Echinacea purpureum*, "Black Sampson," and also to several species of plants related to the sunflower family, this drug is now, as found upon the market, of very uncertain quality. I have known the root of a plant not related to it, thrown upon the market under the name *Echinacea angustifolia*, in large quantities, from sections of the country where Echinicea does not grow. Large amounts of so-called Echinacea have been sold in commerce, differing in every way from the true drug, which grows in great abundance throughout Kansas, Oklahoma, Nebraska and other sections of the West and Southwest. Large amounts of *Eryngium aquaticum* have been dug and sold as Echinacea. The root may be superficially described as follows, as contributed by me to the Eclectic Medical Journal for August, 1897, to which I will add that no attempt is made in this description other than to point to some of its conspicuous characters:—

CHARACTERISTICS. — Echanicea root has a brown or brown-red color. It is much wrinkled longitudially, and the folds of the shrunken epidermis sometimes twist about the root in spiral form. When sliced transversely, the yellowish medullary rays are seen to be separated from each other by a greenish pulp, and when the dried root is broken, the fracture always presents the appearance of having been afflicted with dry rot. Upon chewing the root of prime Echinacea, a sweetish taste first presents itself, which upon prolonged chewing becomes acrid and tingling, which remains long to affect the tongue. This sensation reminds one of aconite, but it is devoid of the benumbing quality of aconite, and unlike aconite, it increases the flow of saliva, instead of inducing dryness of the tongue. Indeed, in its early record, more than one physician inferred from the similarity of taste, that by mistake aconite had been sold under the Echinacea label and wrote me concerning the subject. In early experience with the drug, I found insipid, tasteless lots of the genuine plant, that proved worthless in medicine. These specimens all came from low, wet lands east of the Mississippi River, for the plant is not confined exclusively to the West, and varies much in quality.

Echinacea contains minute amounts of a colorless alkaloid, which, however, does not constitute the therapeutical qualities of the drug. It contains much sugar, and large amounts of coloring matters, which prove injurious if allowed to remain in its preparations. The sensible constituent is a colorless, organic substance of acid reaction, which imparts the sensible properties to the drug, being intensely acrid and persistent — distressingly so in a pure condition. It exists in prime Echinacea in minute amounts, less than one-half of one per cent, and is probably in itself a mixture.



ECHINACEA ANGUSTEFOLIA.

This is a powerful drug as an Alterative and Antiseptic in all tumorous and Syphilitic indications; old chronic wounds, such as fever sores, old ulcers, carbuncles, piles, eczema, wet or dry, can be cured quick and active; also Erysipelas. It will not fail in Gangrene. In fever it is a specific; typhoid can be adverted in two to three days; also in Malaria, Malignant, Remittent, and Mountain fever it is a specific. It relieves pain, swelling and inflammation, by local use, internal and external. It has not, and will not fail to cure Diphtheria quick. In curing bites, from the bee to the rattlesnake, it is a specific. Has been tested in more than fifty cases of mad dog bites in human, and in every case it prevented hydrophobia It has cured hydrophobia It is perfectly harmless, internal and external.

DOSE.—One-half to one fluid-drachm 3 or 4 times à day.

Manufactured by **H. C. F. MEYER, M. D.,**

PRICE, $
Patent.

PAWNEE CITY, NEB., U. S. A.

The Citral Assay of Volatile Oils.*

By *E. Kremers* and *I. W. Brandel.*

With the discovery of citral, first in the oils of *Eucalyptus staigeriana* and *Backhausia citriodora*[1] in 1888 and a little later in oil of lemon[2] by Bertram and in other oils with more or less of a lemon-like odor, both the qualitative and quantitative examination of oil of lemon entered upon a new period. Up to 1888 limonene was the only known constituent of the oil that was well authenicated. By some it was claimed that pinene was a natural constituent of the oil but the frequency with which oil of turpentine was used as an adulterant rendered all such assertions rather doubtful. Whereas pinene could not be found in 50 kilos of an authentic oil that was examined particularly with reference to this hydrocarbon,[3] the same investigators have since admitted the presence of traces of pinene.[4]

The facts that the odor of oil of lemon is quite distinct from that of pure limonene and that the better quality oils cannot be made by distillation demonstrated clearly that the peculiar aroma of oil of lemon was due principally to constituents unknown in 1888. The isolation of citral at that time from oil of lemon was, therefore, an important step in advance. With it the possibility was given of working out a chemical method for the assay of the oil. Unfortunately, however, the somwhat earlier discovery of citral in much larger quantity[5] in another oil[6] had already given into the hands of the skillful adulterator the means of circumventing the good results that might be obtained by a process of assay still to be worked out.

Although today the methods of sophistication of oil of lemon are less crude and although the sophisticated product of today unquestionably resembles true oil of lemon in every respect more closely than did the essence adulterated with turpentine oil twelve and more years ago, it is still rather doubtful whether lemon oil, as it reaches the consumer, is now less commonly or less extensively adulterated than formerly.

---

* This account is based on a thesis for the Ph. G. degree by F. H. Chamberlain, U. W., 1901.

[1] Ber. S. & Co., April 1888, p. 20.

[2] Ber. S. & Co., Oct. 1888, p. 17; G.-H.-K., p. 467.

[3] Ber. S. & Co., April 1897, p. 19; Oct. 1898, p. 22.

[4] Ber. S. & Co.

[5] 5—7 p. c. in oil of lemon and 75 p. c. in oil of lemongrass.

[6] Price of 1 lb. of oil of lemon $1.85 in 1901, of oil of lemongrass, $1.75.

The reasons for this state of affairs are two fold: Firstly, no satisfactory method of assay has yet been devised; and secondly, the adulterator is in a position to defy any method of assay or examination that takes into consideration citral only.

Aside from the so-called lemon camphor or citraptene, which is non-volatile, oil of lemon contains the following additional constituents: 1. phellandrene,[7] identified by the chemists of Schimmel & Co.; 2. citronellal, identified by Doebner[8] in 1888; 3. geranyl acetate found in the oils from Messina and Palmero by Umney and Swinton[9] in 1898; 4. linalyl acetate claimed to have been found by the same chemists in the oil from Palmero and to the presence of which the difference in the odor of this oil from that from Messina is supposed to be due at least in part; and 5. a sesquiterpene found by Oliveri[10] in 1891.

Although a large number of investigators have worked on oil of lemon since the first quarter of the past century, its composition is for all that not yet satisfactorily cleared up. The chemical examination of commercial oils, therefore, had to be restricted to the detection of substances foreign to a natural oil and to the citral assay. The first part of this problem is not difficult if restricted to pinene, alcohol and other substances readily detected, but it is impossible for the present if it is made to include the detection of citral from some other oil by means of slight impurities that may adhere to it, not being removed in the process of separation from the other constituents of such oil. The citral assay, though it may seem rather simple from a theoretical point of view, has presented numerous practical difficulties, so that, as already stated, we are to-day not in the possession of a method, the results of which have not been severely criticised.

Method I. With Sodium Acid Sulphite.

Aside from the method of fractional distillation, it was but natural that that method by means of which citral, like other aldehydes, can be separated from most other constituents of volatile oils should have been first suggested as a means of assay. It is possibly in this manner that Schimmel & Co. ascertained in a rough way the percentage of citral in oil of lemon.[11]

---

[7] Ber. S. & Co., Oct. 1897, p. 28.

[8] Arch. d. Pharm., 232, p. 688; Berichte, 27, p. 352.

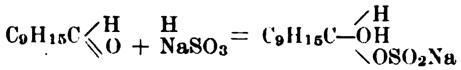
[9] Pharm. Journ., 21, pp. 196 & 370.

[10] Gazz. chim. Ital., 91 [1], p. 318; Berichte 24, p. 624, Ref.

[11] Ber. S. & Co., Oct. 1888, p. 17; Oct. 1893, p. 49.

In their semi-annual reports, Schimmel & Co. repeatedly state that they are at work on a method of assay and hope to realize one that will be satisfactory even if performed by non-chemists. Up to the present time, however, neither their own chemists nor anyone else has proposed a method which they could pronounce satisfactory. It was 1897 when they reported that they had tried the acid sulphite method some years before but without satisfactory results.[14]

When it became definitely known that citral $C_{10}H_{16}O$ was an aldehyde, the reaction with $NaHSO_3$, according to analogy, was expressed by the following equation:



$$C_9H_{15}C\begin{matrix}\diagup H\\ \diagdown\!\!\diagdown O\end{matrix} + \begin{matrix}H\\ NaSO_3\end{matrix} = C_9H_{15}C\begin{matrix}\diagup H\\ -OH\\ \diagdown OSO_2Na\end{matrix}$$

In 1894, however, Heussler[16] showed that unsaturated aldehydes like cinnamic aldehyde have the capacity to add a second molecule of $NaHSO_3$. That citral with its two double bonds likewise possessed this additional additive power for $NaHSO_3$ was shown by Tiemann in 1893. Whereas the first addition product is insoluble in water, the second is soluble. From the former, citral can be regenerated through the action of an alkaline carbonate. A third compound is theoretically possible.

Stiehl[18] in 1898 claimed that there were three isomeric aldehydes: citral, citriodora aldehyde and allo-lemonal, since the aldehyde constituents $C_{10}H_{16}O$ of lemon grass oil behaved in different ways towards sodium acid sulphite. A criticism of Stiehl's views will be found in Schimmel & Co.'s Bericht.[19]

The above considerations reveal that the reactions involved in this process of assay are not as simple as might have been supposed when this problem first presented itself.

Another theoretical as well as practical difficulty presents itself in the presence of citronellal in the oil of lemon. This being an aldehyde, it likewise combines with sodium acid sulphite. As an unsaturated aldehyde, $C_{10}H_{18}O$, with one double bond, it also possesses the capacity to combine with two molecules.[20] In the method of assay as described in G.-H.-K., "The Volatile Oils" p. 470 the citronellal addition product is insoluble in both the aqueous and oily liquids. In as much as it floats in the oily layer and frequently settles to the bottom of this layer, it prevents accurate reading.

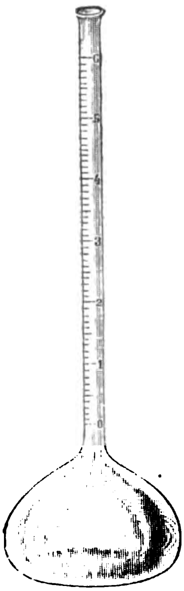
---

[14] Ber. S. & Co., April 1897, p. 19.
[16] Berichte, 24, p. 1805.
[18] Journ. f. pr. Chem., 58, p. 51.
[19] Ber. S. & Co., Oct. 1898, p. 66.
[20] Proc. Wis. Ph. A.

The importance of accurate reading will become apparent from a single illustration. In the duplicate assay of a commercial sample of lemon oil, the following readings were obtained, viz. 4.7 cc. and 4.65 cc. a difference of 0.05 cc. Whereas in ordinary volumetric analysis such a difference can often be overlooked, in the assay of lemon oil it becomes fatal to accurate work because of the small percentage of citral present. The one result gave a percentage content of 6 p. c., the other one of 7 p. c., a difference of 1 p. c. between the two.

Although not suited to accurate work, the method will readily disclose large differences in citral content and is, therefore, serviceable. The method now commonly used is mentioned in G.-H.-K. "The Volatile Oils" p. 196 and described under cassia oil p. 388 as follows:

"For the assay a special flask, cassia flask or aldehyde flask, of about 100 cc. capacity is used. The neck of the flask is 13 cm. long, has an inner diameter of 8 mm. and is calibrated to 1/10 cc. The neck has a capacity of about 6 cc. The zero mark is fixed slightly above the point where the flask is narrowed into the neck. By means of a pipette 10 cc. of oil are transferred to the flask and an equal volume of 30 p. c. sodium acid sulphite solution is added. The mixture is shaken and the flask placed in a boiling water bath. After the solid mass has become liquid more acid sulphite is added, the mixture being constantly heated and occasionally shaken until fully three fourths of the flask is filled. The solution is heated until no more solid particles are visible and the odor of aldehyde has disappeared. When the clear oil floats upon the salt solution, flask and contents are allowed to cool and sufficient acid sulphite is added to raise the lower limit of the oily layer to the zero point on the scale. The number of cc. of oil is read off and by deducting this number from ten, the aldehyde content is ascertained. Accurately speaking percentage by volume and not percentage by weight is determined in this manner."



As stated above, Schimmel & Co. made use of the acid sulphite method but not being satisfied with the results, they did not further report upon it.[21]

---

[21] Ber. S. & Co., April 1897. p. 19.

In 1894 Umney[22] stated that he had adapted the cinnamic aldehyde method to the assay of citral and seems to be satisfied with the results obtained. He, however, did not work with citral mixtures of known composition.

In 1896 Garnett[23] reported that, following Umney's suggestion, he had obtained much lower results with the acid sulphite method than with the method he proposes. (Reduction and subsequent acetylization). In as much as it has been shown that Garnett's method gives false results, this statement means but little, for it does not become apparent from his paper that he applied the acid sulphite method to citral mixtures of known composition.

In 1897 Soldaini and Berte[24] made use of this method for the citral assay of lemon oil.

In 1897 G. Mancuso-Lima[25] used the acid sulphite as a means of removing the citral for the purpose of examining the remaining hydrocarbons. For a criticism of this method compare the report of Schimmel & Co.[26]

As a crude method of assay, Umney and Swinton[27] made use of the method in 1898.

In 1898 Tiemann, while engaged in his renowned controversy, had occasion to test the various methods for the assay of citral. He arrives at the conclusion that the indirect methods (the acid sulphite or the cyanacetic acid methods) are the best. For the direct methods see the valuation of citral as citryl-naphtocinchoninic acid and as semicarbazone.

In 1899 Schimmel & Co.[28] state that for a number of years they have made use of the acid sulphite method, devised by them in 1891 and at that time applied to the cinnamic aldehyde assay in cassia oil, for the citral assay of lemongrass oil. They found that the citral content of this oil varied between comparatively narrow limits, viz. 75 to 83 p. c. Attention may here be called to the fact that the objection raised against this method when applied to lemon oil does not apply to its use with lemongrass oil. The citral assay of lemon oil demands a method that gives reliable results within a few tenths of one percent, whereas a difference of several percent in the assay of lemongrass oil is of comparatively little consequence.

---

[22] Pharm. Journ., 54, p. 81.
[23] Chem. & Drugg., 48, p. 599.
[24] Ber. S. & Co., April 1897, p. 19.
[25] Ber. S. & Co., April 1898, p. 21; from Le staz. sperimentali agrar. ital., 30, p. 681.
[26] Loc. cit.
[27] Pharm. Journ., 61, p. 196; 61, p. 870.
[28] Ber. S. & Co., April 1899, p. 78.

The difficulty caused in reading off the volume of non-aldehyde constituents of lemon oil by the insoluble citronellal hydroxysulphonate of sodium floating in the oily layer of the assay flask may possibly be overcome by the observations of Tiemann[29] made in 1899 that citronellal is not affected by a dilute aqueous solution of sodium sulphite and sodium bicarbonate, whereas citral goes into solution as the dihydro-di-sulphonate of sodium.

Barbier[30] in 1899 made use of the acid sulphite to separate citral from the oil of *Lippia citriodora*, but apparently did not use this reaction for determining the percentage of citral in the oil. (65—70 p. c. determined by fractionation.)

In 1899 Idris[31] applied the acid sulphite method to terpeneless oils of lemon and found a very variable citral content. He does not, however, pass any criticism on the method or seem to consider any criticism seriously.

In August 1899 the chemists of the London Essence Co.[32] state that they have made many experiments with the acid sulphite method and obtained concordant and, in their estimation, satisfactory results. Mixtures with 5, 7 and 10 percent of citral dissolved in the hydrocarbons from lemon oil carefully fractionated so that they no longer contained anything absorbable by acid sulphite, gave the following results:

I. Assays made by A. C. Chapman:
  A 5 p. c. solution gave 4.8, 4.9 and 5.0 percent.
  A 7 p. c. solution gave 6.8, 6.4 and 7.2 percent.
  A 10 p. c. solution gave 9.2, 10.0 and 10.4 percent.
II. Assays made by chemists of London Essence Co.:
  A 6.6 p. c. solution gave 6.3 p. c. as the mean of 7 analyses.
  A 7.3 p. c. solution gave 7.0 p. c. as the mean of 7 analyses.

In September 1899 Parry criticises the conclusions (low citral percentage of commercial lemon oil when assayed by the acid sulphite process) of the chemists of the London Essence Co. and points to the criticism by Tiemann of the bisulphite method. (Tiemann stated that it was necessary to shake oils several times to extract all of the citral. In as much as this criticism is passed on lemongrass oil, it may not apply to lemon oil).

---

[29] Ber. 32, p. 812.
[30] Bull. Soc. Chim., IV, 21, p. 635; Ber. S. & Co., Oct. 1899, p. 74.
[31] Chem. & Drugg., 55, p. 217.
[32] Chem. & Drugg., 55, p. 372.

In 1899 Soldaini and Berte[33] suggested the use of potassium acid sulphite in place of the sodium salt and described an apparatus which possesses certain advantages over the cassia flask and insures the same conditions for each assay. Their directions are as follows:

> Five ccm. of oil of lemon are measured off, at a known temperature, into a cylindrical pipette, graduated to 1/40 ccm. This is poured into a fractionating-flask holding about 100 ccm. The neck of the flask should taper to such an extent that it may be united with the inverted pipette by means of India rubber tube. The side-tube of the flask is bent upward and may be closed by a piece of India-rubber tube and a cock. To the oil in the flask are added 25 ccm. of a solution of potassium bisulphite slightly supersaturated with sulphurous acid, and the mixture is agitated briskly. The mixture is then heated for 10 minutes on a boiling water-bath, being well shaken at short intervals, care being taken to heat the flask only so much that the bottom may be touched by the naked hand. Then, under constant shaking it is allowed to cool, again warmed for 5 minutes (the shaking meanwhile being continued) and finally allowed to cool completely. The side-tube is next united with a funnel-tube through which any desired quantity of water may be introduced into the flask. The pipette, cleaned and dried, is placed inverted upon the top-opening of the flask with the aid of an India rubber tube. A small quantity of water is introduced through the side-tube and the supernatant oil is induced to rise into the pipette by means of tapping. Isolated oil drops adhering to the wall may be dislodged and carried away by allowing air bubbles to enter through the side-tube. When all the oil has been collected in the graduated portion of the pipette, the oil-layer is left to become entirely clear and its volume is read off from the scale. The volumetric percentage can be easely calculated from this figure. By taking 0.850 as a basis for the average specific gravity of lemon oil, the volume proportion may be reduced to weight. When a certain quantity of turpentine is present, the aqueous solution, even after 24 hours, shows a milky cloudiness. If the oil contains turpentine or bitter orange oil, an orange colored, flocculent voluminous precipitate occurs at the top of the turpentine layer.

Gulli and Stavenhagen[34] in 1903 recommended the assay, according to the directions of Soldaini and Berte, having assayed hundreds of samples, they arrived at the conclusion that oil of lemon contains from 7 to 7.3 p. c. of citral, with the exception of the oil obtained in an abnormal season, when the percentage was as low as 6.5 p. c. In a criticism of the above results, Parry in 1903 claimed that while Soldaini and Berte's method was applicable to the determination of the aldehyde in cassia oil, it was not applicable to the determination of citral in lemon oil. Parry also denied the presence of 7 p. c. of citral in lemon oil. Oils sealed and labelled with a garantee of 7 p. c. were found to contain only about 3 p. c. In a previous communication in the same year Parry[35] had protested against the practice of selling lemon oil, guaranteed to contain 7 p. c. of citral. He argued that oil of lemon, after being entirely freed from terpenes, does not contain more than 50 p. c. of citral. The theoretical yield, therefore, of terpeneless oil should be at least 14 p. c. of the original oil which he claims is more than twice the amount actually obtained. Chapman[36] in 1903 agreed with the argument made by Parry and based on the yield of terpeneless oil. He also does not believe in a 7—8 p. c. citral content of the natural oil. Bennett[37] in the same year was not able to get a yield exceeding 5 p. c. and thinks that the citral content of the average oil does not exceed 3.5 p. c. He recommends the sodium bisulphite method as the most common means of assay.

---

[33] Bull. Soc. Chim., 38, p. 537; Ber. S. & Co., April 1900, p. 22.
[34] Chem. and Drugg., 63, p. 401.

The London Essence Co.[38] in 1903 claimed to have first pointed out that it is impossible for any normal lemon oil to contain 7 p. c. of citral, and are inclined to put the figure even lower than 3.5 p. c.

* * *

The acid sulphite method was tried in this laboratory, under different conditions by different operators with the results shown in the accompanying table. The 5 p. c. mixture used in the experiments was a 5 p. c. solution by weight of citral in limonene. The citral was prepared by shaking commercial citral from S. & Co. with 30 p. c. sodium acid sulphite solution. The solid addition product was filtered off, washed with alcohol and ether, and the citral regenerated with sodium carbonate. The limonene used was prepared by shaking crude limonene, sp. gr. 0.8534 at 20°, $[\alpha]_D^{20°} = +64.16°$, three times with 30 p. c. sodium acid sulphite solution, and then distilling it with steam. The rectified limonene had a sp. gr. of .8534 at 20°, and $[\alpha]_D^{20} = +64.13$.

In as much as the solubility of the terpenes in the excess of sulphite solution greatly effects the accuracy of the assay, an attempt was made to ascertain the factor of correction by determining the solubility of the limonene, free from citral, in the sulphite solution. It was found that no satisfactory correction could be decided upon, since the solubility of the limonene in the sulphite solution was so largely dependent on conditions that could not be accurately described. Thus e. g. the amount of shaking of the mixture appeared to influence the solubility of the hydrocarbon in the acid sulphite very materially.

---

[35] Chem. & Drugg., 63, p. 277.

[36] Chem. and Drugg., 63, p. 341.

[37] Chem. & Drugg., 63, p. 341.

[38] Chem. & Drugg., 63, p. 341.

In the diluted acid sulphite solution, however, the limonene is practically insoluble. In as much as a diluted solution was found to be preferable for the assay, a correction became unnecessary.

The following table gives the results of the assay of the 5 p. c. solution of citral in limonene:

I. Flask was filled with Sulphite Solution after heating.

Amt. of oil used.	Diminution of vol. of oil.	P. c. of citral.	Experimentor.
Heated with 25 cc. of sulphite sol. for 1 hour.			
5 cc.	0.3 cc.	6 p. c.	Brandel
5 cc.	0.4 cc.	8 p. c.	“
20 cc.	1.3 cc.	6.05 p. c.	“
Heated with 10 cc. of sulphite sol. for 1 hour.			
5 cc.	0.25 cc.	5 p. c.	Tweeden
5 cc.	0.3 cc.	6 p. c.	Whittaker
5 cc.	0.3 cc.	6 p. c.	“
Heated with 25 cc. of sulphite sol. for 30 minutes.			
5 cc.	0.3 cc.	6 p. c.	Rabak
5 cc.	0.325 cc.	6.5 p. c.	Brandel
5 cc.	0.3 cc.	6 p. c.	“
Heated with 10 cc. of sulphite sul. for 30 minutes.			
5 cc.	0.4 cc.	8 p. c.	Whittaker
5 cc.	0.4 cc.	8 p. c.	“
5 cc.	0.2 cc.	4 p. c.	Tweeden
5 cc.	0.2 cc.	4 p. c.	“

II. Flask was filled with water after heating.

Amt. of oil used.	Diminution in vol. of oil.	P. c. of citral.	Experimentor.
Heated with 25 cc. of sulphite sol. for 1 hour.			
5 cc.	0.25 cc.	5 p. c.	Brandel
5 cc.	0.25 cc.	5 p. c.	“

Heated with 25 cc. of sulphite sol. for 30 minutes;

5 cc.	0.25 cc.	5 p. c.	Brandel
5 cc.	0.25 cc.	5 p. c.	Tweeden
5 cc.	0.25 cc.	5 p. c.	Rabak
5 cc.	0.25 cc.	5 p. c.	"
5 cc.	0.4 cc.	8 p. c.	Whittaker
5 cc.	0.6 cc.	6 p. c.	"
5 cc.	0.25 cc.	5 p. c.	Brandel
5 cc.	0.25 cc.	5 p. c.	"

Heated with 25 cc. sulphite sol. for 20 minutes.

5 cc.	0.25 cc.	5 p. c.	Brandel
5 cc.	0.25 cc.	5 p. c.	"

Heated with 25 cc. sulphite sol. for 15 minutes.

5 cc.	0.25 cc.	5 p. c.	Brandel
5 cc.	0.225 cc.	4.5 p. c.	"
5 cc.	0.2 cc.	4 p. c.	"
5 cc.	0.25 cc.	5 p. c.	Tweeden
5 cc.	0.2 cc.	4 p. c.	Rabak
5 cc.	0.225 cc.	4.5 p. c.	"
5 cc.	0.3 cc.	6 p. c.	Whittaker
5 cc.	0.25 cc.	5 p. c.	"

A sample of lemon oil from Fritzsche Bros., N. Y., was assayed, by heating with 25 cc. of sulphite solution for 30 minutes and diluting with water.

5 cc.	0.225 cc.	4.5 p. c.	Brandel
5 cc.	0.225 cc.	4.5 p. c.	"
5 cc.	0.225 cc.	4.5 p. c.	Rabak
5 cc.	0.225 cc.	4.5 p. c.	"
5 cc.	0.2 cc.	4 p. c.	Whittaker
5 cc.	0.2 cc.	4 p. c.	"

The following method for the assay of citral in lemon oil with acid sulphite is recommended:

Transfer 5 cc. of the oil with a pipette[39] to a cassia flask (see G.-H.-K., p. 388), add 25 cc. of 80 p. c. sodium acid sulphite solution and place the flask in a water bath at a temperature of 60° for 30 minutes, shaking the flask from time to time. After allowing the flask and contents to cool completely, dilute gradually with distilled water, shaking well after each addition, until the flask is filled.

---

[39] The pipette should previously be callbrated in comparison with the flask used.

The Proposed Volatile Oils of the U. S. P. 1900.

By *Edward Kremers.*

XXX. OLEUM SANTALI.

Oil of Santal.¹)

[OIL OF SANDAL WOOD]

*A volatile oil*³) *distilled from the wood of* Santalum album²) *Linné* (*nat. ord.* Santalaceæ).

*Oil of Santal should be kept in well-stoppered bottles, in a cool place, protected from light.*⁴)

*A pale yellowish or yellow,*⁵) *somewhat thickish liquid, having a peculiar, strongly aromatic odor,*⁶) *and a pungent, spicy taste.*⁷)

*Specific gravity: 0.970 to 0.978 at 15° C. (59° F.)*⁸)

It deviates polarized light to the left (distinction from Australian *(spec. grav. 0.953) and* West Indian *(spec. grav. 0.965)* Sandal Wood Oil, *which deviate polarized light to the right).*⁹)

Readily soluble in alcohol, the solution being slightly acid to litmus paper.

If to 1 Cc. of the Oil, at 20° C. (68° F.), there be added 10 Cc. of a mixture of 3 volumes of alcohol and 1 volume of water, a perfectly clear solution should be obtained (test for cedarwood oil, castor oil *and* other fatty oils, *etc.*).¹⁰)

1) Oil of sandal wood is officinal in the following pharmacopœias: Austr., Brit., Dan., Gall., Germ., Helv., Hisp., Ndl. S., Norv., U. S. In the U. S. P. it has been officinal since 1880.

2) Other species of *Santalum* yield oils, some of which have commercial value. The properties of these oils as compared with those of the officinal oil are herewith tabulated as recorded by G.-H.-K.* Whether the alcohol of *S. cygn.* calculated as santalol is identical with this substance or not, has not been determined.

---

* The vol. oils, pp. 338—346; comp. also Parry, pp. 185 to 187.

	Sp. Gr.	α_D	Solubility in 70 p. c. alc.	Santalol content	Color	Odor	
Santalum album	0.975 to 0.980	—17° to —19°	in 5 parts	93—98 p. c.	Light yellow.	Faint, peculiar to santal	
S. preissianum (S. Australian)	1.022				Cherry-red	Pleasantly balsamic, reminding of roses	
S. cygnorum (W. Australian)	0.953 to 0.965	+5° 20′		75 p. c.		Unpleasant, resinous.	In India and China it is used as a substitute for oil from *S. a.*
S. yasi (Fiji)	0.9768	—25.5°				Faint, but not delicate	
S. species (African)	0.969				Ruby-red	Resembles E. I. oil	

3) The principal constituent or constituents of sandal wood oil are alcoholic in nature and amount to 90 and more per cent. This alcohol, or probably mixture of alcohols, is commonly known as santalol and the formula $C_{15}H_{25}OH$ is generally assigned to it. The oil is supposed likewise to contain the corresponding aldehyde, santalal, and a sesquiterpene or sesquiterpenes. The presence of several acids is also claimed by some investigators.

As pointed out, the exact nature of the 90 p. c. of alcoholic constituents is not satisfactorily understood, much less the composition of the remaining 10 p. c. of the oil. Some of the work has been done on questionable oils.

4) The usual precautions.

5) "Pale yellow in coulour" Br. "Pale yellow" Ph. G. A darker color might indicate that the oil was distilled over direct fire, or the presence of some other sandal wood oils (Comp. 2).

6) "Having a strongly aromatic odour" Br. "Sandal wood oil possesses a spicy, ambra-like odor" Ph. G. ". . . . . a faint, but persistent odor" G.-H.-K., p. 340. ". . . . . characteristic aromatic odour," Parry, p. 181.

8) The specific gravity requirements of the several phaemacopœias are herewith recorded.

0.960 Austr.
0.970—0.978 U. S.
0.970—0.985 Dan., Norv.
0.97 —0.98 Helv.
0.975—0.980 Brit.
0.975—0.985 Germ.
0,975—0.990 Ndl. S.

"The author has met with genuine samples with rather wider limits than these (0.975—0.980 Brit.), from 0.973 to 0.981." Parry, p. 181.

"The sp. gr. of a normal oil lies between 0.975 and 0.980. The Indian oils . . . have a higher sp. gr. and a darker color due to decomposition products." G.-H.-K., p, 340.

"The sp. gr. at 15° should not to be below 0.975." C.-D.-P., p. 185.

9) "It rotates the plane of a ray of polarized light to the left, through an angle not less than 16° and not more than 20°, in a tube 100 millimetres long (absence of other varieties of sandal wood oil)." Br.

"The optical rotation of the oil is fairly constant, seldom, if ever, varying outside the limits —15° to —20°." Parry, p. 181.

"The angle of rotation varies between narrow limits, viz. —17 to —19°." G.-H.-K., p. 340.

"The rotatory power for 100 mm. should be within —17° and —19°. Cedarwood oil and some oils of copaiba increase this deviation; on the other hand, Cuban cedarwood oil and most oils of copaiba which are dextrogyrate, deminish it." C.-D.-P., p. 185.

10) "It forms a clear solution with six times its volume of alcohol (70 p. c.) (absence of cedarwood oil)." Br.

"Sandalwood oil has a slightly acid reaction and forms a clear solution in 5 parts of dilute alcohol." Ph. G. [69—68 p. c. by volume; made by diluting 7 p. of alcohol (by weight) with three parts of water].

An important feature in examening the oil is its solubility in from 5 to 6 volumes of 70 p. c. alcohol." Parry, p. 182.

"The solubility in alcohol should be determined at 20°, 1 vol. of oil in 5 vols. of alcohol of 70 p. c." C.-D.-P., p. 185.

"With 5 parts of 70 p. c. alcohol sandalwood oil yields a clear solution which is not rendered turbid by the further addition of alcohol. Upon age, especially under the influence of light and air, its solubility diminishes and then yields turbid mixtures in the ratio mentioned." G.-H.-K., p. 340.

Santalol Assay.—According to Schimmel & Co., the assay is best carried out according to the following directions:

About 20 g. of sandalwood oil are gently boiled for 1½ hour with an equal volume of acetic acid anhydride and a small amount of fused sodium acetate. The product is washed with water and soda solution and the resulting oil dried with anhydrous sodium sulphate. Of the dried oil, 2—5 g. are boiled with an excess of N/1 potassa V. S. and the excess of alkali ascertained by titration with N/1 sulphuric acid V. S.

The amount of santalol is calculated with the aid of the following formula:

$$P = \frac{a \times 22.2}{s-(a \times 0.42)}$$

P = Santalol content of the original oil.

a = Number of cc. N/1 potassa V. S. consumed.

s = Amount of acetylized oil, expressed in grams, used for saponification.

Concerning the alcohol content compare No. 3.

"East Indian sandal-wood oil consists of 94 to 98 per cent. of alcoholic constituents, commonly called santalol." — "The free alcoholic . . . . should never fall below 90 per cent. Cedar wood oil, gurjun oil, and copaiba oil all yield a very low acetylation figure (calculated as santalol, as follows: Cedar oil, 8 to 12 per cent; copaiba oil, 5 to 8 per cent; gurjun oil; 7 to 10 per cent.). Castor oil is also sometimes added as an adulterant, but is easily detected on account of its lower gravity and high saponification number."

XXXI. OLEUM SASSAFRAS.

Oil of Sassafras. 1)

*A volatile oil*3) *distilled from Sassafras.*2)

*It should be kept in well-stoppered bottles, protected from light.*4)

*A yellowish or reddish-yellow*5) *liquid, having the characteristic odor or sassafras without the odor or camphor,*6) *and a warm, aromatic taste.*7) *It becomes darker and thicker by age and exposure to the air.*

*Specific gravity: 1.070 to 1.090 at 15° C. (59° F.).*8)

*Soluble, in all proportions, in alcohol,*9) *the solution being neutra to litmus paper; also soluble, in all proportions, in glacial acetic acid, and in carbon disulphide.*10)

If to 5 drops of the oil 5 drops of nitric acid be added, a violent reaction will take place, producing at first a red color, and finally converting the oil into a red resin.[11])

If to a few drops of the oil a drop of sulphuric acid be added, a deep-red color will be produced at first, which becomes blackish.[12])

1) Oil of sassafras is officinal in a few pharmacopœias only, namely in the following: Gall., Hisp., Port. and U. S. It is also contained in the Germ. S. In the U. S. P. it has been officinal since the first edition. Safrol, which is to be made officinal in the new edition of the U. S. P., is not officinal in any of the other pharmacopœias.

2) Sassafras is defined by the U. S. P. as "The bark of the root of *Sassafras variifolium* (Salisbury), O. Kuntze (nat. ord. *Laurineae*). The French Pharmacopœia directs the oil to be distilled from the wood; the Portuguese, also Germ. S., from the roots.

According to G.-H.-K., p. 395, "the older bark and wood are odorless. The green parts of the tree, when crushed, smell faintly aromatic* but not of safrol. The wood of the roots and especially the root bark are more rich in oil cells."

The root bark is said to yield 6—7 p. c., the woody part of the root less than 1 p. c. of oil. (G.-H.-K., p. 397.) Although the wood is poor in oil, it appears to be used at least at times. Comp. G.-H.-K., p. 397. (The wood is split, or sawed into thin pieces.". . . . "The exhausted wood is dried and used as fuel"); also illustration on p. 398.

"The root bark (except the outer layers) is the most aromatic portion of the plant, and from this, as well as the wood, the essential oil is distilled." Parry, p. 166.

Though the practice to use other parts of the tree than the root may be limited, the accounts given of the distillation at different times show that the distiller does not restrict himself to the bark of the root, as directed by the U. S. P., but uses the entire root. The source of the oil as given in the Portuguese Pharmacopœias and in the German Supplement, therefore, appears to harmonize better with actual practice.

According to Power & Kleber,† sassafras oil has approximately the following composition:

---

* The leaves yielded 0.028 p. c. of oil. G.-H.-K., p. 407.

† This journal, vol. 14, p. 101.

Safrol	80.0 p. c.
Pinene Phellandrene	10.0 p. c.
d-Camphor	6.8 p. c.
Eugenol	0.5 p. c.
High boiling substances (sesquiterpene and residue)	3.0 p. c.
	100.3 p. c.

Of these substances, safrol is regarded generally as the principal constituent.

4) The usual precautions.

5) "Yellowish or reddish-yellow." G.-H.-K., p. 397.

"Sassafras oil is a colorless liquid which becomes yellow on exposure to air." C.-D.-P., p. 670.

"Colorless or yellowish." Germ. S.

6) "Having the odor of safrol." G.-H.-K., p. 397.

"Its odor is agreeable, reminding somewhat of fennel." C.-D.-P., p. 670.

7) "An aromatic taste." G.-H.-K., p. 397.

8) "Sp. gr. 1.070—1.080. G.-H.-K., p. 397.

"Sp. gr. 1.070—1.075." Germ. S.

"The limits allowable are 1.065 to 1.095 for specific gravity." Parry, p. 167.

The sp. gr. of a wood oil, distilled by Schimmel & Co., was idential with that of an oil distilled by them from the bark, viz. 1.075.

9) "Soluble in all proportions in 90 p. c. alcohol." G.-H.-K., p. 397.

11) Bonastre's test, 1828.

Optical Activity. " = +3 to +4°." G.-H.-K., p. 397.

"The limits allowable are .... +1° to +4° for the optical rotations." Parry, p. 167.

Adulteration. Sassafras oil is frequently adulterated with camphor oil. A perfectly pure article appears to be of rare occurrence. Inasmuch as camphor oil contains all of the constituents found in sassafras oil, the detection of the former is exeedingly difficult, but its presence may be indicated by strong variations in the specific gravity and other physical properties. Under the name of artificial sassafras oil, fractions of camphor oil having a specific gravity similar to that of true sassafras oil are sold. (G.-H.-K., p. 401; Comp. also Parry, p. 168.

Pharmaceutical Legislation in New York During the Early Seventies.

DOCUMENT 9.

[*New-York Daily Tribune*, Friday, July 28, 1871, p. —, col. —.]

LOCAL MISCELLANY.

THE DRUGGISTS' PERPLEXITY.

THE NEW LAW IN OPERATION — EXASPERATION OF THE DRUGGISTS—THEIR MEETING YESTERDAY—THE LAW TO BE RESISTED.

Accounts of the experience of the individual commissioners would be desirable.

The Board for examining and licensing druggists and their clerks assembled yesterday morning, at their apartments in the north wing of the residence of their Chairman, Prof. Doremus, in Union-place, on Fourth-ave., all the Commissioners being present. A number of applicants were examined, making the total number 23. Applicants were questioned in chemistry, poisons and their antidotes, practical pharmacy, and officinal botany, materia medica, the adulterations of drugs, and prescriptions. Commissioner Theobald Frohwein has in his room pharmaceutical instruments for testing the practical skill of the candidates. Commissioner Graham as in his department samples of pure and impure drugs, which the candidate is required to designate unaided. Commissioner O'Leary writes out prescriptions in full, in Latin, and requires the candidates to know whether there is any excess of ingredients, whether there is any incompatibility in them, and whether they are in due proportion. Commissioner O'Leary has found great ignorance in this department. As all prescriptions are written in Latin, and frequently the direction for their use by European practitioners in this city, it is not alone the duty of the druggist and prescription clerk to make up the prescription, but also to explain the manner in which it is to be used by the patient. Prof. Doremus requires a familiarity with poisons and antidotes, but does not expect the older druggists to be as well acquainted with chemical formulas as the younger men. He states that it is a mistake to suppose that a thorough knowledge of botany will be required, as only officinal botany must be understood. Prof. Doremus's private laboratory is used in the examination. The Commissioners have decided that if an applicant proves deficient in any one of the several branches composing the examination, he can reapply, provided the application is made within the next five months, as at the expiration of that time no one will be permitted to dispense drugs who is without a license.

One applicant was unable to read a prescription, and others showed a lamentable ignorance in drugs. Some applicants have not waited for notices, but, understanding that the Board was in session, voluntarily appeared for examination.

Prof. Doremus considers the charges for certificates extremely low, and cites the case of an applicant who exhibited a certificate wherein he was credited with having paid £40 sterling for the privilege of entering a drug store and learning the business, independent of fees paid afterward for degrees. He thinks the law will elevate the profession, and call into requisition Colleges of Pharmacy that are now struggling with adversity. He believed that many of the clerks would attend lectures, and improve their knowledge of their profession, if it were not for the closeness of their employers, whose permission could not be obtained. The Commissioners will reply to the protest of the druggists to-day, and substantially declare that the act of March 28, 1870, annuls the law of 1839.

Can any one supply a copy of the reply?

DRUGGISTS IN COUNCIL.

At 4 p. m. a large number of excited druggists and prescription clerks assembled at Harmonia Hall in Prince-st., to discuss the new law. All disliked it, and said so; many of them affirming in private conversation that they had no desire to undergo the inquisition of Prof. Doremus, whose name appeared to have excited some consternation. Dr. S. G. Cook called the meeting to order, and then read a long address embodying his views, and the views of other druggists whom he had met. It was intensely severe upon the Democratic rulers of this State, who would certainly lose the support of the druggists and those whom they could influence, if the obnoxious law was not repealed. The law was oppressive and unjust in its details and an outrage in its practical execution. It had seemed to him that the "most wise and sovereign rulers" of this State had suddenly become aware of the necessity of positions for a few more of their friends, and finding that no vacancies existed, overcame the difficulty by creating the Drug Commission.

It remained to be seen whether the druggists would submit to the yoke. This law was not made for the druggists, as they did not want it. The people did not want it, and the Legislature had no right to spring this trap upon the druggists. The head of the Board was an eminent chemist and toxicologist, whom none could pass except by favor. The speaker proposed that the Board should be made a sinecure like many others under the local Government, and the members be allowed to draw their $2,500 a year unmolested by the druggists or their clerks.

These gentlemen of the Board had already transcended their duty in summoning druggists before them, when the law simply read "that it shall be their duty to examine on application." He proposed that no applications should be made to them, as the Board could not begin proceedings until the lapse of six months, by which time a new Legislature will have met, and means can be taken to have this law repealed.

If this law could prevent the loss of a single life, druggists would not protest against it, although knowing the source and motive from which it originated. But it would not save life, as all mistakes arose from carelessness and not ignorance.

Dr. Cook's address was unanimously adopted, and a permanent organization of the Druggists' Protective Union was effected by the adoption of a Constitution and the election of the following officers: President, Dr. G. S. Cook; Vice-Presidents, Frederick Hoffman, A. M. Conklin, and R. B. Powell; Secretaries, S. G. Ginner and A. L. Putney; Treasurer, Gustave Ramspyer. A Committee was appointed to draft by-laws, and another Committee, consisting of one member from each Ward, was authorized to wait upon the druggists in their respective Wards and obtain signatures to the Constitution, and subscriptions in aid of the movement. Appended are the names of the Committees: On By-Laws—M. Dame, J. M. Fesser S. Campbell, A. Menzies, and S. G, Cook. On Signatures—E. G. Ehlers, Wm. A. Thayer, F. Norman, F. L. Mitchell, B. T. McKane, —— Ayres, Frederick Hoffman, —— Chambers, H. Walters, A. H. Deakin, John Ebling, Alfred Anderson, F. H. Miller, Samuel Campbell, H. Cooper, and Alexander Menzies.

See DOCUMENT 7. Who prepared this constitution and when?

CAN THE NEW DRUG LAW STAND?

To the Editor of The Tribune.

SIR: As the new Drug law is attracting a great deal of attention, and not a few comments, some remarks made from a different point of view may be interesting. That the retail drug trade of the city was in sore need of regulation and reconstruction, nobody will deny. Everybody admits, also, that the intentions of the Legislature were excellent when they passed the law in question. But a little reflection shows that the law will have an effect diametrically opposite to the intentions of its makers; and that, being carelessly framed by gentlemen ill acquainted with the subject they were legislating upon, it is in danger of breaking down altogether whenever brought to the test of the courts.

This statement is a direct contradiction to Mr. Cook's statement above. Comp. lines 85 et seq.

The intention of the Legislature was to protect the public against druggists' mistakes, by elevating the standard of the pharmaceutical profession. We want better druggists; but how shall we get them? Educate them, of course; when you want good lawyers, you encourage law schools; when you want good physicians, you foster medical schools; if you want good druggists, you must strengthen and encourage schools of pharmacy; if you discredit them, you lower the standard of the profession, and you cut off the supply of educated pharmacists; for it is those schools and not any number of examining boards that bring forth competent druggists.

There is in New-York an excellent school of pharmacy, unfortunately without political influence; last Winter, a good number of young men were following its lectures, with the intention of graduating; immediately on the passage of the law, *one-half of the students left the college.* Is that what the law intended? I will leave the public to draw their own conclusions from that fact.

Further information on this episode is desired.

The ignoring altogether the New-York College of Pharmacy was eminently unwise; if the Legislature thought it inefficient, and it is not, they should have made it more efficient. If they found fault with its management or charter, they had power to amend it. But the licensing of druggists should have been given to that College, under supervision, if necessary, of competent persons appointed by the Mayor or Governor.

Another aspect of the law also deserves attention. There is on the statute book a law passed in 1839, by which all graduates of the New-York College of Pharmacy and other regular schools are granted the right of practicing pharmacy, to the exclusion of all persons not graduates. It is understood that that law has not been repealed; but even supposing the new law supersedes it, do you think the Legislature has the power to take away the right granted by that law to those who conformed with its provisions? Can a druggist, once lawfully declared competent, be compelled to undergo examination a second time? Why, no; the Board themselves allow that, for they announce that graduates of regular schools will have only to pass such informal examination as will be sufficient to prove they are the persons to whom the diploma has been granted. But the *fee* must be paid, and $30 is an item of consideration to all, especially to druggist. The question will likely come before the courts, and, as the odds are against the Board, the whole law may collapse, its beneficent provisions sharing the fate of the inconsiderable ones. No complaint can be made against the composition of the Board; they are all gentlemen of learning and ability, who will treat every one with fairness and due consideration. I may say that, though I am a graduate of the New-York College of Pharmacy, I am not a member of the institution, and that I am no longer subject to the provisions of the new law. Yours respectfully,

Compare DOCUMENT 1.

Brooklyn, July 27, 1871. JULES L. A. C.

Who was "Jules S. A. C." whose unbiassed opinion (see line 197) is of value in such a heated controversy as this.

DOCUMENT 10.

[New Yorker Staatszeitung, 8. August 1871, p. ——, col. ——.]

Das neue Apothekergeſetz.

Other accounts of German papers should prove of value.

Das Verlangen nach einem Geſetz, welches den Verkauf von Arzneimitteln regelt, manifeſtirte ſich ſchon ſeit längerer Zeit, nicht nur im Publikum im Allgemeinen, welches darin einen Schutz gegen gefährliche Verſehen ſuchte, ſondern auch ganz beſonders unter den Apothekern ſelbſt, denen daran gelegen ſein mußte, daß die Achtung vor ihrem Stande, zu dem die intelligenteſten Bürger gehören, nicht durch die Unwiſſenheit einiger Pfuſcher beeinträchtigt würde. Ein Apothekergeſetz hatte daher eine weittragende Bedeutung nach beiden Seiten hin. Um ſo mehr muß es überraſchen, daß nun, da ein ſolches erlaſſen iſt, gerade unter den Apothekern eine lebhafte Oppoſition dagegen ſich geltend macht, welche ſich nicht etwa gegen einzelne Mängel des Geſetzes, ſondern gegen daſſelbe überhaupt richtet. Wenigſtens haben alle bisherigen Verſammlungen ſowohl der deutſch- wie der anglo-amerikaniſchen Pharmaceuten nur den Zweck gehabt, eine Injunction gegen die Durchführung des Geſetzes zu erwirken, während das große Publikum daſſelbe nicht nur gut heißt, ſondern in ſeinen Beſtimmungen vielfach auch für nicht ſtreng genug hält.

Das Geſetz enthält im Weſentlichen folgende Punkte: 1) Der Mayor der Stadt New York wird autoriſirt, eine Commiſſion, aus einem ſachverſtändigen Pharmaceuten, einem Droguiſten und zwei „Phyſicians“ — ein Begriff der ſowohl Naturforſcher wie Mediziner umfaßt — beſtehend, zu ernennen. Dieſe Commiſſion hat das Amt, alle Droguiſten und Apotheker und alle von ihnen jetzt angeſtellten oder künftig anzuſtellenden Gehülfen zu prüfen, ſoweit dieſelben mit der Anfertigung von Recepten oder mit der Verabfolgung von Arzneimitteln betraut werden. 2) Sechs Monate nach der Organiſation der Commiſſion hat Jeder, der, ohne ein Examen vor derſelben beſtanden zu haben, als Apotheker fungirt, eine Geldſtrafe bis zu $500 oder eine Gefängnißſtrafe bis zu ſechs Monaten oder beides zu gewärtigen. 3) Die Commiſſion hat ſich zehn Tage nach ihrer Ernennung zu organiſiren und die von ihr ausgeſtellten Certificate ſollen als „Licenſes“ betrachtet werden. 4) Der Betrag für eine ſolche Licens iſt unter Zuſtimmung des Mayors von der Commiſſion feſtzuſetzen. 5) Der Erlös aus dieſen Licenſes iſt zur Deckung der Examinationsgebühren beſtimmt; der Ueberſchuß fließt in die Stadtkaſſe.

6) Die Entſchädigung der Commiſſion wird dem Rath der Superviſoren anheimgegeben, doch mit der Beſchränkung, daß kein Mitglied der Commiſſion mehr als $2,500 erhalten darf. 7) Sollten die Licensgebühren die Ausgaben nicht decken, ſo iſt der Ueberſchuß durch Steuern aufzubringen. — Hiezu ſind noch folgende Nebengeſetze erlaſſen:

Art. 2. Die Licensgebühren ſollen für Apothekenbe-Beſitzer $30 und für Gehülfen (prescription clerks) $10 betragen.

Art. 3. Der Modus über die Prüfung der Applikanten wird dem Ermeſſen des Commiſſärs jedes beſonderen Departements anheimgeſtellt.

Art. 4. Jedes Mitglied der Commiſſion ſoll über die Prüfungen ein Protokoll führen.

Art. 5. In jenem Protokoll ſoll durch eine Ziffer — zwiſchen 10, als der beſten, und 1, als der ſchlechteſten, variirend — dem Candidaten ein Prädikat gegeben werden. Kein Candidat ſoll ein Certificat erhalten, der nicht in allen Fächern durchſchnittlich das Prädikat 6 erhält

Art. 6. und 7. Vor der Prüfung haben ſich die Applikanten über Bezahlung der Licens auszuweiſen; ſollten ſie das Examen nicht beſtehen, ſo wird ihnen das Geld zurückerſtattet.

Die Gründe, welche von den Apothekern gegen daſſelbe vorgebracht werden, ſind vornehmlich folgende:

This part of the editorial is of special value because it takes up the arguments of the opposition and discusses them seriatim.

Das Geſetz ſei kein univerſales, ſich auf den ganzen Staat beziehendes, ſandern ein Lokalgeſetz So richtig dieſer Einwand iſt, ſo berührt er doch die weſentlichen Beſtimmungen des Geſetzes nicht, ſondern er bezieht ſich nur auf die Ausdehnung ſeiner Wirkſamkeit Ein derartiges Geſetz iſt vorzüglich für die großen Städte nothwendig, und wenn man es für zweckmäßig erachtet, es allmälig auf den ganzen Staat auszudehnen, ſo kann dies ohne große Schwierigkeiten durch künftige Amendements geſchehen. Wir erinnern bei dieſer Gelegenheit daran, daß in Preußen, deſſen Apothekerordnung als vorzüglich allgemein anerkannt wird, die Apotheker, jenachdem ſie das Examen beſtanden haben, in zwei Klaſſen getheilt werden, und daß es nur denen erſter Klaſſe geſtattet iſt, eine Apotheke in einer größeren Stadt zu übernehmen. Hiemit hängt auch ein anderer Einwurf zuſammen. Es wird nämlich behauptet, daß es kein Inſtitut giebt, in welchem ſich die Pharmaceuten auf ein Examen genügend vorbereiten können. Dies trifft aber auf die Stadt New York nicht zu, denn wir haben hier ein College of Pharmacy, welches von Sachverſtändigen für eine vorzügliche Anſtalt gehalten wird. Schon aus dieſer Rückſicht war es zweckmäßig, vorderhand die Wirkſamkeit des Geſetzes auf die Stadt New York zu beſchränken und erſt Mittel zu ſchaffen, um es auf den ganzen Staat ausdehnen zu können.

Sodann behauptet man, daß das Geſetz eine rückwirkende Kraft habe, weil es die Rechte einer gewiſſen Klaſſe von Bürgern, die unter anderen Geſetzen erworben wurden, beeinträchtige. Es handelt ſich indeſſen bei dem Apothekerfach nicht um ein lediglich kaufmänniſches Gewerbe, ſondern die Pharmaceuten nehmen deßhalb vor anderen Gewerbetreibenden eine hervorragende Stelle ein, weil man bei ihnen im Publikum eine gründliche wiſſenſchaftliche Bildung vorausſetzt. Während nämlich das Publikum bei ſeinen Einkäufen im Allgemeinen eine ſehr genaue Kenntniß der Artikel, deren es bedarf, beſitzt, herrſcht in Bezug auf Droguen unter demſelben die größte Unwiſſenheit. Es verläßt ſich vollkommen auf den Apotheker, und ohne Zweifel iſt es, wenn auch bisher nicht beſtimmt formulirte Geſetze über die Verabfolgung von Arzneimitteln exiſtiren, gewohnheitsrechtlich feſtgeſtellt, daß die Apotheker die volle Verantwortung dafür tragen müſſen. Das Publikum hat jederzeit das Recht zu verlangen, daß Alle, welche ſich mit der Verabfolgung von Arzneimitteln befaſſen, die nöthigen Vorkenntniſſe dazu beſitzen. Muß es ſich aber — wie es unläugbar vorgekommen iſt — von dem Gegentheil in einzelnen Fällen überzeugen, ſo hat es das Recht, ſich vor ſchädlichen Irrthümern geſetzlich zu ſchützen.. Wie ſehr dies geboten iſt, zeigt ein „Eingeſandt" in einem engliſchen Blatte, worin nachgewieſen wird, daß die Unwiſſenheit einzelner Apotheker ſoweit geht, daß ſie die einfachſten Fragen nicht zu beantworten wußten. Auf der anderen Seite zeigt jener Einſender, daß in den Prüfungen vor den Commiſſären von den Candidaten nur ſolche Kenntniſſe verlangt werden, wie ſie zum Betrieb einer Apotheke durchaus geboten ſind.

Ein ſtrenges Geſetz iſt gerade für Amerika eine Nothwendigkeit, weil ſich die Leute, welche ſich krank fühlen, hier zu Lande in den meiſten Fällen zuerſt an den Apotheker wenden: der Arzt wird erſt bei ſchwereren Krankheiten conſultirt. Was durch dieſe Praxis angerichtet werden kann, wenn der Apotheker nicht eine genaue Kenntniß von den Arzneimitteln und ihrer Wirkung hat, erſehen unſere Leſer aus einem „Eingeſandt" an einer anderen Stelle dieſes Blattes.

Ferner wird von den Apothekern die Anſicht geltend gemacht, daß das Geſetz dem Publikum wohl gegen die Unwiſſenheit einiger Apotheker, nicht aber gegen die Fahrläſſigkeit derſelben Schutz gewähren könne. Es liegt auf der Hand, daß dieſer Einwurf unhaltbar iſt. Sollte man deßhab, weil man gegen Verſehen, die aus

Fahrläſſigkeit entſtehen, nicht geſchützt werden kann, gegen die Folgen der Unwiſſenheit keinen Schutz beanſpruchen dürfen? Je mehr übrigens von einem Manne bei Uebernahme einer verantwortlichen Stellung verlangt wird, um ſo mehr wird in ihm das Gefühl für die Verantwortlichkeit derſelben ausgeprägt, und zweifellos wird mit der Einführung ſtrenger Prüfungen auch die Sorgfalt der Apotheker bei der Bereitung und Verabfolgung von Arzneimitteln eine ſtrengere werden. Das Publikum wird daher von einem ſolchen Geſetz nur Vortheil ziehen können und ſollten die Apotheker ſelbſt darin nicht auch das Mittel erblicken, ihrem Stande die Achtung, die ihm mit Recht zukommt, zu ſichern?

DOCUMENT 11.

[The Druggists' Circular and Chemical Gazette, September 1871, p. 148.]

Examination of Druggists in New York.

IN carrying into practical effect the law passed by the last Legislature of the State of New York, it is the duty of the Board of Examiners to notify all druggists and Clerks who prepare "medical prescriptions," that they must present themselves for examination within six months from the time the Board should be organized. This time will expire in December next. The law is odious to druggists, and is almost universally denounced as unjust. Let us inquire into the origin of the law, what will be the probable results of it, and what remedy can be proposed as a proper substitute. It is well known that it was not intended originally for a public benefit, but rather as a means of making new offices for the friends of those having political power. When the bill was first presented in the Legislature, it was denounced by those who looked into it as unjust, and it was confidently reported that it would not pass. It was supposed that the druggists would "buy the bill," and thus kill it in embryo. Persons in the trade believed it would fall through, because of its inability to remedy the evels it pretended to cure, and because also of its fraudulent character. In the meanwhile a Committee of the College of Pharmacy drafted a law, which was forwarded to Albany and placed in the hands of one of the representatives from this city. It was found, however, that it was impossible to have any favor shown the substitute, and that the "Ring" had determined that their "pet scheme" should prevail. With an amendment inserted at the

Who constituted this committee and where can a copy of the draft referred to be obtained?

request of Gov. Hoffman, it became a law. Had the druggists of this city foreseen its true character, and shown the energy then they have displayed since, it would have been defeated. The object of the act is to protect life and prevent the dispensing of prescriptions by incompetent persons. Is this really accomplished? While it cannot be denied that among apothecaries there is (as in every profession or vocation) a certain amount of ignorance, will this law really effect the purpose of educating the industrious or removing the wilfully careless? No provision for education is inserted in the bill, nor are any allowances made for those who have already educated themselves and graduated in Colleges of Pharmacy.

What does the law accomplish? It establishes another of the irresponsible branches of our city mis-government? — a Board of Commissioners, with its consequent expenditures, to be supported by levying a new *tax* on druggists. In fact, it is looked upon as but a pretext to bleed a branch of business for the benefit of the jackals who hunt for the lions of the "Ring". The penalty for non-compliance is a fine of $500, or imprisonment for six months, or both. It also *accepts* a fee of thirty dollars from each master druggist and ten dollars from each clerk of the arduous task of pronouncing upon his competency! And what does the person receive for the fee thus exacted? He is, if competent, to receive a handsome certificate emblazoned with the "city arms," and stating that he has passed an examination satisfactory to the Board!

What arguments were brought against the members of the board which justified the accusations of graft and irresponsibility?

Does this protect the public from carelessness? Does this prevent the employer or employed from neglecting his duty to the public? Does this educate any body? Does it make him more competent? Will he be less liable to fall into error? It is a pretty well-known fact that quite as many mistakes are made from carelessness as from ignorance; but this law protects the public from neither. Its only effect is to create a Board and support it by an unjust levy upon a single class of citizens, instead of causing the expense to fall on the public, who are supposed to be the parties that will be benefited.

With this law, in fact, serve the public weal? The answer must be no! Will it benefit the apothecary? No! again. It does not educate nor render him more competent or careful. Nor will it weed out the incompetent:

Compare the replies to arguments in DOCUMENT 10.

as the President of the Board asserts it will; for the threatenings of the law are only the roll of theatrical thunder.

It is estimated that some twenty-two thousand dollars may be realized during the first six months assigned for examinations. During the same period the expenses should not exceed, at the most exaggerated figures, the half of that sum. After that time the duties of the Board will be only nominal. Will the same excellent gentleman then still comprise the Board? The law was framed to benefit certain parties who, it is understood, were to have been appointed; but fortunately, perhaps, some of them were overlooked, and the present Board were named. They are generally acceptable persons, and no one doubts their ability to perform the duties justly. But will they continue to hold their office? Even now it is confidently asserted that others will replace them after the "heavy work" is over. The tendency of "Commissions" in this city is to become foci of power and patronage.

Who were these persons and what is there to justify such an assertion?

What is the duty of the fraternity of druggists? "The law is supreme and must be obeyed," is the motto of many. We would not advise differently. The law, however, can be rendered ineffectual by replacing it with a better. We know that many of the trade counsel resistance, and organizations have been formed to resist. But we think these organizations cannot accomplish the object they seek. The law will be supported, and organized opposition will not avail to destroy it. The examination will continue, and, though unjust, it will be perhaps best to "accept the situation" and submit. The remedy proposed is to supersede the present law by a better one. How to accomplish this, and the form of law which would be most acceptable, is the query of many. Unity is essential. Organize a fair representative body of the druggists and adopt some law which will suit the majority, This is being done, and will, we trust, meet the cordial co-operation of the druggists of this city and Brooklyn. About twenty-five of the leading dispensing druggists met, on the 31st of July, at the Fifth Avenue Hotel, and, after discussing the matter, appointed a committee consisting of Messrs. Jas. Condie, A. M. Conklin, H. A. Cassebeer, J. W. Shedden, and P. W. Bedford, to prepare a constitution and by-laws, as also to take legal advice. We are informed, that a general meeting will be held in the latter part of September, of which due notice will be given in the daily

Are the minutes of this meeting still in existance?

papers, at which all druggists are cordially invited to attend. The object of this Association will be to unite the fraternity, and endeavor to adopt a suitable bill to present to the Legislature.

Laws will probably be enacted soon in many of the States of the Union; and it is well to see that, whatever laws may be framed, they are free from the errors of the New York law. We would suggest that the main features to be secured are *education*, examination, and graduation of all who hereafter propose to enter upon the business, while those who are established already, but voluntarily desire examination, shall, on satisfactory proofs of their competency, be furnished with a certificate to that effect, at a moderate charge — (not thirty dollars!) The Examining Board should, perferably, be the officers of Examining Committees of Colleges of Pharmacy where such exist; otherwise a selection should be made from suitable names which might be proposed by compe. tent persons in the business.

How does this clamor for "education" harmonise with the demands of the druggists all over the U. S. since this law was superceded by one more to the liking of the objectors?

Some bill must be presented by the druggists of New York and Brooklyn which will secure a majority, else a modification of this bill may be introduced that will continue the present system with its unjust taxation, to perpetuate an expensive and unnecessary Board.

Brooklyn is marked for the next victim. Will its apothecaries unite with those of New York to protect themselves against such an imposition. We hope druggists in every state will prepare to resist unnecessary and onerous legislation.

You Can Do What He Did

THIOCOL ROCHE is a water-soluble, easily taken, effective form of guaiacol. It is likely to be in special demand during the colder months, as it is used in tuberculosis, pneumonia, chronic bronchitis, etc. It is marketed in four forms: Powder; 5-grn. Tablets; Sirolin (Syr. Thiocol Roche), 6 grn. to teaspoonful; and Syr. Thiocol Comp.

Last January a druggist of Cumberland, Maryland, wrote to us asking for 20 copies of Merck's Digest on Thiocol. His object was to distribute this printed matter among his local physicians. Recently he wrote for other literature, making this incidental statement: "With the literature on Thiocol that you sent me last winter, I succeeded in getting a very profitable demand for the article."

You Can Do What He Did

MERCK & CO.

UNIVERSITY PLACE,
NEW YORK.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street | **111 Fifth Avenue**
PHILADELPHIA | **NEW YORK**

— Die —

Deutsche Botanische Monatsschrift

beginnt demnächst ihren XX. Jahrgang. Sie kostet jährlich 6 Mark und sei allen Botanikern und Freunden der heimischen Flora bestens empfohlen.

Arnstadt, Thüringen.
Prof. Dr. G. Leimbach.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation

Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

ANNOUNCEMENTS BY ADVERTISERS.

The new General Manager of Parke, Davis & Co. is **Ernest G. Swift,** heretofore Manager of the Canadian laboratory and the entire Canadian business of the House. Mr. Swift was elected at a special meeting of the Board of Directors held on December 17 to succeed William M. Warren, whose untimely death was so universally regretted a few weeks ago. That the mantle has fallen upon deserving shoulders admits of no doubt; and that the business of this great house will go forward to new conquests and larger and still larger fields of activity is promised in the very character of the man who will now guide its destinies.

Best eingeführter

...Kaufmann...

im Deutschen Reiche, sucht Vertretung in der ***Apotheker- und Drogenbranche.***

Gefl. Offerten unter 508 postlagernd ***Bromberg.***

Verlag von Herman Heyfelder — Berlin.

Chemisch-technisches Repertorium.

Uebersichtlicher Bericht über die **neuesten Erfindungen, Fortschritte u. Verbesserungen auf dem Gebiete der technischen und industriellen Chemie.**

Herausgegeben von **Dr. Emil Jacobsen.**

— 35. Jahrgang. —

Mit in den Text gedruckten Illustrationen. 1896

NEW EDITION

Webster's International Dictionary

25,000 NEW WORDS, ETC.

Prepared under the direct supervision of W. T. HARRIS, Ph.D., LL.D., United States Commissioner of Education, assisted by a large corps of competent specialists and editors.

New Plates Throughout. Rich Bindings.
2364 Pages. 5000 Illustrations.

Better Than Ever for Home, School, and Office.

Also **Webster's Collegiate Dictionary.**

Specimen pages, etc., of both books sent on application.

G. & C. Merriam Co., Springfield, Mass.

WEBSTER'S INTERNATIONAL DICTIONARY

Chicago College of Pharmacy.

THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF ILLINOIS.

The forty-fourth session begins September 29th, 1903. The course comprises two terms of seven months each and leads to the degree of Graduate in Pharmacy. Write for the announcement to . . .

W. B. DAY, ACTUARY,
465 STATE ST., CHICAGO.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

ples and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

SOME OF THE NEW BOOKS.

We present below a selection from the Fall books published or announced, including only those that romise to be the most important or the best sellers.

GIFT BOOKS.

Bar Sinister, The. By Richard Harding Davis. New illustrated edition. With 8 full-page drawings in color by E. M. Ashe. $1.50.

A pretty story of a dog, said to be drawn from life. Attracted attention when published in Scribner's, and sold well in ordinary book form.

Checked Love Affair, A. By Paul Leicescter Ford. Illustrated in color, with numerous pictures in photogravure, and decorated. $2.00.

A new story and probably the last by this author that will see the light.

Colonel Carter's Christmas. By F. Hopkinson Smith. With 8 full-page pictures in color by F. C. Yohn. $1.50

A new story about a favorite character in modern fiction.

Heart of Hyacinth, The. By Onoto Watanna. With marginal drawings in tint by a Japanese artist. Illustrated in color. Net $2.00.

A very attractive gift-book.

In Arcady. By Hamilton Wright Mable. With 4 full-page illustrations by Will H. Low, and numerous decorations in color by Charles L. Hinton. .... Net $1.80

Mrs. Wiggs of the Cabbage Patch. By Alice Hegan Rice. Illustrated edition. With 24 illustrations, 12 in black and white, and 12 reproduced in color. by Florence Scovel Shinn. $2.00.

The ordinary edition (at $1.00) is still selling well, and there is no doubt that this style will be very popular for the holidays.

Weaker Sex, The. By Charles Dana Gibson. Net $4.20.

A new Gibson book is one of the events of the year, and always popular.

FICTION.

Adventures of Gerard, The. By A Canon Doyle. Illustrated. $1.50.

Gerard is an old friend, and his adventures are very entertaining.

Barlasch of the Guard. By Henry Seton Merriman. Illustrated by the Kinneys. $1.50.

Mr. Merriman is continuously popular, and his books always find a ready sale.

Castle of Twilight, The. By Margaret Horton Potter. Illustrated in tint by Ch. Weber. $1.50.

A serious and thoroughly interesting study of woman's life in feudal days. The fifth book of this remarkable young writer.

Cherry. By Booth Tarkington. Ilustrated in color by A. I. Keller. With decorations. $1.25.

A charming story of old New York, in the bright style of "The Two Vanrevels."

Forest Hearth, The. By Charles Major. $1.50.

A story of Indiana in the 'thirties, by the writer who won so great a success with "When Knighthood was in Flower.

Fortunes of Fifi, The. By Molly Elliot Seawell. Illustrated in colors by T. de Thulstrup. $1.50.

A merry little comedy of the time of Napoleon, who plays a pleasant part therein.

Heart of Rome, The. By F. Marion Crawford. $1.50.

This promises to be one of the best of this favorite author's novels—dealing with the city he loves and knows so well.

Jewel. A Chapter in Her Life. By Clara Louise Burnham. Illustrated. $1.50.

A story by a popular writer showing the good accomplished by Christian Science, even through the medium of a child.

John Burt. By Frederick Upham Adams. Illus. $1.50.

A story that has attracted a great deal of attention while running as a serial.

Little Shepherd of Kingdom Come, The. By John Fox, Jr. Illustrated by F. C. Yohn. $1.50.

Probably destined to be the leading novel of the Fall. Like all of this writer's it is a Kentucky story and the most important he has yet written.

Long Night, The. By Stanley J. Weyman. Illustrated. $1.50.

A story of Geneva in the late Middle Ages, by a writer whose stories of adventures long ago have always sold well since the publication of "A Gentleman of France."

Mettle of the Pasture, The. By James Lane Allen. .... $1.50.

A story involving a question of conscience. The book has aroused a great deal of attention and discussion.

Over The Border. By Robert Barr. $1.50.

Mr. Barr has chosen the time of Cromwell for his new book, and it is safe to say that it will be interesting.

Rebecca, of Sunnybrook Farm. By Kate Douglas Wiggin. $1.25.

One of Mrs. Wiggin's entertaining stories, full of a delightful humor, and a fresh feeling for life and nature.

Sanctuary. By Edith Wharton. Illustrated by Walter Appleton Clark.. $1.50.

A strong and vivid story, treating of a psychological situation arising from a question of heredity.

Vagabond, The. By Frederick Palmer. Illustrated by Harrison Fisher. $1.50.

An interesting story of which the latter and longer part is concerned with the Civil War. It is well told and full of incident.

BIOGRAPHY AND HISTORY.

Cambridge Modern History. Planned by the late Lord Acton. Per vol., Net $4.00.

II. The Reformation. VII. The United States.

This is one of the most important historical works for several years. The volume on the United States, by both English and American writers, has proved of the greatest value.

Gladstone, The Life Of. By Rt. Hon. John Morley. Illustrated with portraits, facsimiles, and other pictures. 3 vols. Net $10.50.

The most notable book of the Fall, long announced and eagerly awaited. It is history as well as biography, by the best authority.

Old Quebec: The Fortress of New France. By Sir Gilbert Parker. With over 100 illustr. Net $3.50.

The author is a Canadian, and tells the story of the historical and romantic old town with the truth of history and the charm of fiction.

MISCELLANEOUS.

Five Nations, The. By Rudyard Kipling. Net $1.40.

The first colection of Mr. Kipling's poems since 1896. There are about twenty-five new poems, besides the most famous recent ones.

Forest, The. By Steward Edward White. Illustrated by Thomas Fogarty. Net $1.75.

No reader of "The Blazed Trail" needs to be told that Mr. White can write an intensely interesting book on forests and forest-life.

Glimpses of Truth. By Bishop J. L. Spalding. With new photogravure portrait. Net $0.80. Half calf or half morocco, gilt top. Net $2.00.

Some of Bishop Spalding's helpful philosophy in the form of aphorisms.

JUVENILE..

Crimson Fairy Book, The. By Andrew Lang. Illustrated in color and in black and white. Net $1.60.

Henty Books. Two new ones: Through Three Campaigns; With the Allies to Pekin. Illustrated. Per vol., Net $1.20.

Orchardland. By Robert W. Chambers. With 7 full-page illustrations in color and many marginal drawings by Reginald B. Birch. Net $1.50.

A companion to "Outdoorland," published last year.

Star Fairies, The, And Other Tales. By Edith Ogden Harison. Illustrated in color by Lucy Fitch Perkins. Net $1.25.

A charming successor to "Prince Silverwings," by the wife of the mayor of Chicago.

Two Little Savages. By Ernest Thompson Seton. Profusely illustrated by the author. Net $1.75.

A book of woodcraft for boys, by the author of "Wild Animals I Have Known."

ll books postage free, except those marked "Net," for which add 10 per cent for postage.
Discount allowed on all books not marked net.

We carry the most complete stock of

ENGLISH AND GERMAN BOOKS.

cientific and technical Works, Periodicals & Newspapers
are furnished on short notice, or if not in stock will be procured without delay at moderate prices.

The Geo. Brumder Book-Department, Milwaukee, Wis.

Money in
Perfume Essences

Only dilution with cologne spirits is required to produce all the "swell" odors of triple and quadruple extracts from our

ABSOLUTE ESSENCES

They represent highly concentrated compositions of perfume bases and each odor is complete in itself.

Price list and descriptive literature on demand.

Manufacturing Perfumers **LEHN & FINK** New York

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

CARBOLIC ACID.

We remind druggists that our Acid is sold under the "Gilt Label" brand which has been well and favorably known to druggist and physicians for many years. Our Acid has a high melting point, 40° C., which is above the requirements of the Pharmacopoeia and of the brands usually sold. When ordering Carbolic Acid, ask your jobber to send you the "M. C. W." brand which costs no more than any other.

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS NEW YORK

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY

DR. FREDERICK HOFFMANN.

EDITED BY

DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 2. **FEBRUARY, 1904.**

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Finances of the A. Ph. A. 41

Whence the present U. S. Pharmacopœia came 43

The Sesquiterpenes. A monograph by *Oswald Schreiner* 60

The citral assay of volatile oils. By *E. Kremers* and *I. W. Brandel* 72

ALPHOZONE

We are introducing to the medical profession the new chemical, Alphozone (succinic peroxide), a most powerful nontoxic germicide and antiseptic. It has many advantages over any other organic peroxide, among them being that it is

non-explosive,
permanent,
soluble and
much more powerful.

Alphozone is a fluffy white powder having a characteristic but by no means disagreeable taste. Extensive experimental work has already proved its great value and that it will be largely prescribed is a foregone conclusion.

Supplied through jobbers or direct. Price: per oz. vial, $4.50; per ½ oz. vial, $2.30; per ¼ oz. vial, $1.20, net.

FREDERICK STEARNS & CO.,
DETROIT, MICH., U. S. A.

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

STEARNS QUALITY
FOUNDED 1855.

Concentrationen eder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H WIRZ,
918-917 Cherry St.,
PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,

DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

SCHERING'S FORMALIN LAMP.

A POWERFUL AUXILIARY IN
WHOOPING-COUGH,
INFLUENZA,
DIPHTHERIA,
MEASLES,
ETC.

RENDERS INFECTION MILDER
AND LESSENS
DANGER OF CONTAGION, WITHOUT
CAUSING
DISCOMFORT.

The only method which transforms solid formaldehyde into a **PURE, EFFICIENT GAS.** Candles burn into water and carbonic acid gas, producing little formaldehyde. Wood-alcohol lamps are also inefficient.

SCHERING & GLATZ, SOLE AGENTS, **58 Maiden Lane, NEW YORK.**

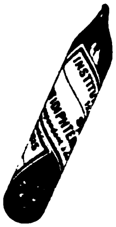
I.P. **PASTEUR SERUMS** I.P.

Antidiphtheritic, ... *liquid or dry.*
Antistreptococcic, ... *liquid or dry.*
Antipest, ... *liquid or dry.*
Antitetanic, ... *liquid, dry or powdered.*

THE ONLY SERUMS
CONSIDERED WORTHY OF IMITATION

The Standard of the World

Direct from Paris to
SHARP & DOHME
SOLE DEPOSITARIES U.S.A.



ACETONESULPHITE

RESTRAINER
Saves Over-Exposures
of any Degree.

SUBSTITUTE
for the
Sulphites.

PRESERVATIVE
Keeps Fixing Baths
Clear and Stable for Weeks.

EDINOL

Best All-Around Developer
for Plates, Paper, etc.
Never Fogs or Stains.

FLASHLIGHT

Practically no Smoke or Dust.
Safe. Efficient.
Strongest Actinity.

PHOTOGRAPHIC PRODUCTS
BAYER
40 Stone St. New York.
FARBENFABRIKEN of ELBERFELD Co.

INTENSIFIER

Works in one Solution,
Which can be used Repeatedly;
Keeps Indefinitely.

FIXING SALT

A Rapid Working Acid Fixing Bath;
Clear and Effective
After Weeks of Use.

Selling Agents for the United States and Canada
FARBENFABRIKEN OF ELBERFELD CO., 40 Stone St., New York.

Trade also Supplied by

EDWARD H. BUEHLER,
134 Lake St., Chicago, Ill.

DOMINION DYEWOOD & CHEMICAL CO.,
Toronto, Ont., Canada.

OCCIDENTAL SUPPLY CO.,
131 Second St.,
San Francisco, Cal.

For Sale by All Dealers in Photographic Supplies and Wholesale Druggists.

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.
(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach.
Pleasant in taste and readily assimilated.

★ ★ ★

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

DOSE FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

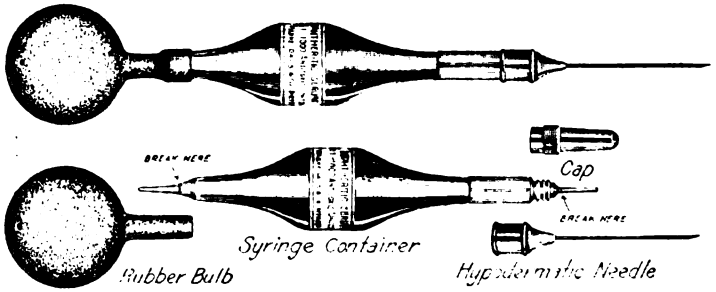
★ ★ ★

KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**

ANTIDIPHTHERITIC SERUM

PACKAGE A - BULB SYRINGE CONTAINER



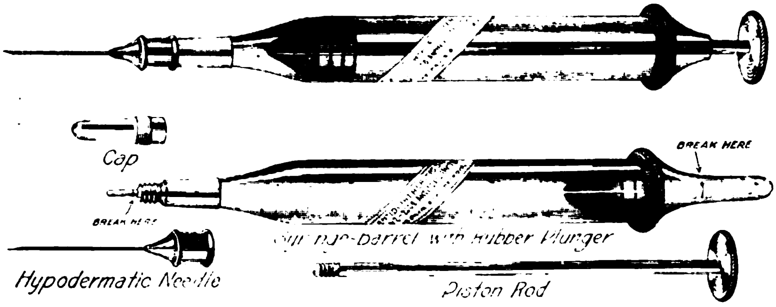
SPECIFY OUR BRAND.

Parke, Davis & Co.'s Antidiphtheritic Serum is staple. It is the serum most in demand by physicians, thousands of whom use it exclusively. We are maintaining a vigorous campaign among practitioners. Keep your stock replenished and take advantage of our advertising, which helps you as well as us.

Our Bulb Syringe and Piston Syringe containers are strictly aseptic and afford quick and easy administration.
We supply Package A on unspecified orders.

PARKE, DAVIS & COMPANY
HOME OFFICES AND LABORATORIES, DETROIT, MICH.

PACKAGE C - PISTON SYRINGE CONTAINER.



Pharmaceutical Review.

VOLUME 22. FEBRUARY, 1904. NUMBER 2.

Editorial.

As an answer to several queries on part of the writer, Mr. S. A. D. Sheppard, Treasurer of the A. Ph. A., has prepared a detailed statement of the receipts and expenses of the association for the entire period during which he so ably filled the position of trust he still holds. This statement throws considerable light on the **finances of the A. Ph. A.** and is of exceeding value. Before taking up any of the features of this report, the writer desires to thank Mr. Sheppard for the service he has rendered our association in the preparation of this statement, especially at a time when his illness made it impossible for him to use a pen and when every mental effort constituted almost a hardship.

The report covers the period from July 1886 to September 1903. Possibly the most striking feature of our association finances is brought out by a comparison of the total annual receipts and expenses as indicated in the following table:

Year.	Receipts.	Expenses.	Balance.	Deficit.
1886	$6563.12	$5259.40	$1303.72	—
7	5665.30	5693.08	—	$ 27.78
8	6628.77	6765.98	—	137.21
9	6143.59	5920.73	222.86	—
1890	7452.91	5579.52	1873.39	—
1	6161.37	6651.27	—	489.90
2	7781.63	6577.43	1204.20	—
3	6606.30	7851.96	—	1245.66
4	6574.59	7566.67	—	992.08
5	5692.00	7413.62	—	1721.62
6	6565.86	6084.38	481.48	—
7	6232.22	6113.38	118.84	—
8	5816.56	6658.13	—	841.57
9	6452.30	8291.83	—	1839.53
1900	5151.86	5755.38	—	623.52
1	6619.33	6757.29	—	137.96
2	7840.17	7709.24	130.93	—
Grand total	....	....	$5335.42	$8056.83

The above tabulation reveals the important fact that during this period the association has been living beyond its means for ten out of the seventeen years. This fact in itself might signify but little if the total balance for those seven years exceeded the total deficit for the ten years. This, however, is not the case. The total deficit for the seventeen years exceeds the total balance by $2721.41. In other words the association has, on the average, lived beyond its means to the extent of $160.08 annually.

This is not an appaling sum for a large association, but the question may legitimately be asked, where did this money come from? If the answer is that it came in part from the General Fund, which should have been increased rather than diminished, the matter of a deficit should not be taken as lightly as it apparently has been taken by the association and those who administered its trusts.

For the present it may suffice to call attention to these general results. The tabulated account of the Treasurer, showing how the annual dues were paid, is equally instructive. It reveals how it was possible to have a credit balance whenever the annual report was made. In the near future the writer will present these figures to the readers of this journal. many of whom are also members of the A. Ph. A.

Another interesting query that arises in connection with the receipts of ths association is the one, how were the several funds of the association established, what interest has been derived from them and how was this interest money spent and the fund itself guarded? A review of this question will be of value.

The page of receipts shows that, during the seventeen years covered by the report, six donations were made by local committees of arrangement. The amounts vary from $42.06 to $429.77. The total amounts to $1351.12 or on an average $225.20. If such donations had been an annual occurrance there possibly would not have been a deficit, for the average donation exceeds the average deficit by $65.12. The question may be asked in this connection whether money raised for the entertainment of the association does not morally belong to the association unless it is returned to the donors, more particularly since the members in attendance are asked to contribute to this fund.

Numerous other lines of inquery are suggested by the valuable report of our Treasurer. In the course of the next few months the writer will attempt to present details concerning the problems merely touched upon at this time. The opinions of members of our association concerning its finances will be gladly received. Thought devoted to this important subject at the present time ought to result in good to the association. A proper discussion now may enable the association to act intelligently next summer.

Lest the writer's intentions be misunderstood, it may be stated that these words are not written as a "calamity" cry. A few members of the A. Ph. A. have repeatedly asked for greater publicity as to the finances of our association. If one year has of necessity been an unusually expensive one, let us know in due season how much the deficit amounts to in order that we may practice proper economy. How can e. g. the members of a large association, doing much of its business in sections, exercise due economy if all are not aware of the exact condition of the treasury. As is apparent from the Treasurer's detailed report, the deficit has mostly, if not always, been covered by dues paid in advance. Thus a credit balance appeared in the Treasurers annual reports. It certainly would have been better for the association's finances if the members had been impressed with this fact.

The writer has the greatest confidence in the future of the A. Ph. A. In order that this future may prove even more useful to American pharmacy, it seems necessary that we should use every effort to make our association stronger financially. To do this it requires more than an increased membership, or paying exhibits. The prime requisite is a better understanding of our financial condition in all of its aspects.

Any one who has compared, though in but a casual manner, the several editions of the U. S. Pharmacopœia must have been impressed by the great difference in the editions before and after 1880. A perfunctionary account of the development of the U. S. Pharmacopœia is to be found in the historical introduction of that book. Similar accounts have frequently been published in pharmaceutical journals. Of a somewhat different nature is the recent article "Whence the U. S. Pharmacopœia came."* Bearing in mind the contrast between the editions of 1880 and 1890, on the one hand, and the previous editions on the other hand, may it not be pertinent to ask the question, **whence the present U. S. Pharmacopœia came?**

---

* Bulletin of Pharmacy, 1903, p. 485.

The question is certainly an opportune one. Not only are we expecting a newly revised edition in the course of the present year, but the American Pharmaceutical Association has just begun to look backward for the study of the past of American pharmacy. Of the role which the A. Ph. A. and especially some of its members have played in the reformation of the U. S. P., we can be justly proud. It may not be amiss, therefore, to recall to the attention of the present generation how this change was brought about.

It is nothing new to point to the interest which the late Dr. Squibb took in scientific pharmacy or to refer to the services he rendered the cause of pharmacopœial revision. As a formost pharmaceutical manufacturer he was keenly aware of the deficiencies of the U. S. P., particularly as represented by the fifth decennial revision. As a medical man, it was but natural for him to look primarily to the medical profession for a remedy. It was only in a secondary way that he looked to the pharmacists of this country for cooperation.

Having concluded to assume the initiative in this reform, he proceeded to lay his plans before the American Medical Association at its meeting in Philadelphia, June, 1876. He was given a respectful hearing and the subject was made a special order of business for the next annual meeting. Although "the plan was favorably received"* it was not discussed at the time,† a rather ominous sign.

When the A. Ph. A. met in the same city a few months later, Dr. Squibb introduced the following resolution at the close of the second session.

> "Resolved, That the American Pharmaceutical Association devote an hour of its third session to a discussion of its interests in the United States Pharmacopoeia, with a view to the adoption or rejection of the following preamble and resolutions:
>
> "Whereas, By the action of the American Medical Association, at its recent meeting in this city, it is proposed to discuss at its meeting, at Detroit, in June, 1877, a proposition for that Association to assume control of the National Pharmacopoeia; therefore,
>
> "Resolved, That this Association offers to the American Medical Association its hearty co-operation in the work, in any way that the Americal Medical Association may find the services of this Association most useful.
>
> "Resolved, That a copy of this preamble and resolutions, with the discussion had thereupon, be forwarded by the President of this Association to the President of the Medical Association."

---

* Proc. A. Ph. A., 24, p. 633.
† Ibidem, p. 648.

The resolution was received and it would appear that the major portion of the next session was devoted to its discussion, for a full account of which the reader will have to be referred to the Proceedings. Suffice it here to present extracts from Dr. Squibb's presentation of the situation and of his plan to remedy it.

"Mr. President and Gentlemen of the Association: The object of this resolution is to bring before you the important subject of the United States Pharmacopoeia of the future, so far as the interests of this Association are concerned, so that by discussion and by any interchange of views, among those present at this meeting, all may have the subject before them in its most prominent bearings for mature deliberation during the coming year, and go to the next annual meeting prepared to act upon the preamble and resolutions suggested with an amount of care and caution proportionate to the grave importance of the subject, and the serious results which would follow any unwise or hasty action.

"The first question to be considered is whether pharmacists have any reasonable or just causes of complaint to prefer against the present Pharmacopoeia, and if so whether these are due to the present plan of revision and management. Then, should this be probable, can the present plan be so amended as to give promise of material improvement in the future; or, can a new plan be suggested that will afford probable advantages enough to justify a radical change from the present one, which in the main has done so well for so many years.

"A free discussion of these points may bring out others, in detail, and will set all to thinking upon the matter, so as to go to the next meeting better prepared for wise and deliberate action.

"That pharmacy has just and reasonable causes of complaint against the present Pharmacopoeia may be supported by the following propositions: First, that it does not represent the progress in pharmacy up to the time of the last revision; and that its more frequent revision, though authorized, has not been attempted by the Committee of Revision. Secondly, that its descriptions and details are insufficient for the attainments of its objects, so far as pharmacy is concerned. Thirdly, that its processes are, many of them, unnecessary and therefore useless; that some of them are defective, while a few are positively bad. Fourthly, that there are more errors in it than the character of the work should admit.

"That these objections to it are due to the present plan of revision and management may be shown to be probable by the following circumstances. The labor involved in bringing the Pharmacopoeia up to the level of pharmaceutical progress at the time for its revision has always been great; and, increasing rapidly with each revision, has now become very great; far too great to be required or expected from any committee of revision voluntarily and gratuitously, while no adequate provision has ever been made for paying for the labor involved. When the work was mainly and so admirably done by Drs. Wood and Bache in the past, it was well and amply paid for by the subordination of the Pharmacopoeia to the Dispensatory of these authors, which latter, as a private book of its authors, has been deservedly one of the most popular, most useful, and most lucrative books of the age. It nevertheless embraced and overshadowed the Pharmacopoeia which was its basis, and gave to its authors the profits of its labors, both upon Pharmacopoeia and Dispensatory, by placing both in an official relation to the Materia Medica and Pharmacy of the nation. Beside these authors, no one has ever received any material consideration, directly or indirectly, for any labor given to the Pharmacopeia. At the time of the last revision, Dr. Bache was dead, and Dr. Wood so infirm in health that his services were not useful, but were rather obstructive to the committee; and have continued to be so unserviceable to the Pharmacopoeia interests, that now, while his Dispensatory still overshadows the Pharmacopoeia, it does not embrace it, and has not been revised to meet the wants of the present plan of revision, whilst, by allowing his publishers to change the date on the title-page of the Dispensatory, it appears to post-date the last revision of the Pharmacopoeia, which it does not contain nor comment upon, while it still, in a large measure, takes its place. Thus the Dispensatory, once far more important and far more valuable than the Pharmacopoeia upon which it was based, more valuable even in the truest interest of that Pharmacopoeia, has now become obstructive to that interest; and this from no fault of its authors, nor any undue greed of gain, but simply because such labor as they gave never should be expected nor asked for, and never can be justly obtained or used without being well paid for. It, therefore, follows that as the services of Drs. Wood and Bache are no longer available to the Pharmacopoeia, their mode of having its labor paid for can no longer be depended upon. And, as this mode is an inseparable part of the present plan of revision, the plan must be objectionable, and cannot reasonably be expected to yield better results in the future than at the last revision, where a committee of five or more gave their time, knowledge, skill and labor, as it could be spared, through a period of more than two years, gratuitously. From this it would appear that the present Pharmacopoeia is as good as can be justly expected, and that its defects may be in great measure chargeable to an attempt to get important labor, which but few have the knowledge and skill to render, without paying for it. If this be true, and if it be unjust and absurd to claim or expect expert labor unpaid for, then the present plan of revision and management is so defective that it never can represent the progress of medicine and pharmacy to the time of revision: and as the more infrequent the revisions the greater the labor; and the more rapid the progress in medicine the more frequent the rivisions are needed, it again follows that the present plan is insufficient and needs reform."

Dr. Squibb then expresses his doubts as to the use of amending the plan of revision without radical changes. The plan which he suggests is in part as follows:

"That the American Medical Association, as the only concrete body or organization which fairly represents the whole medical profession of the United

States, and, therefore, as really owning the United States Pharmacopoeia as one of its most important general interests, should now take possession of the Pharmacopoeia and control it henceforth.

"That it should control and manage the Pharmacopoeia by means of a council to be styled the Pharmacopoeial Council of the American Medical Association. This council to consist of a chairman and four other members. The chairman to be nominated by the Nominating Committee, and elected by the Association as often as the chairmanship may become vacant by action of the Association. by action of the council, or by death or resignation. That the American Medical Association invite the Surgeon-General of the Army, and the Surgeon-General of the Navy, each to select and appoint a medical officer from their respective corps. and invite the American Pharmaceutical Association to select and appoint two pharmacists to constitute the pharmacopoeial council.

"That this council under the American Medical Association shall be charged with the entire control and management of the Pharmacopoeia in all its details, and be empowered to employ one or two editors and other experts when necessary to do the work properly, and to use the income from the copyright of the book to pay its expenses.

"This council should be ordered to revise and publish the Pharmacopoeia once in five years, and to issue a fasciculus or small inexpensive volume in addition, each year, giving the best attainable information in regard to new remedies and their uses, and the important elements of progress in the Materia Medica and Pharmacy up to the time of the annual publication."

The discussion which followed can be found in the Proceedings. That some of the members were not pleased with the subordinate role to be played by pharmacists need scarcely be pointed out. The resolution was finally placed on the table for a year to be taken up after the A. M. A. had discussed the subject and taken action.

At the Detroit meeting of the A. M. A. in 1877, Dr. Squibb's plan met with a defeat that he had not looked for. How keenly he felt this is best revealed by his own words when, at the Toronto meeting in 1877, he reported his experiences to the A. Ph. A.

"So far as I am concerned in the unfinished business that was handed down from last year and now called up by the Business Committee there is nothing to be done. The design and plan with which that was presented to the Association last year has been entirely, and I was going to say ignominiously, defeated. Perhaps that would be the proper word; and so far as this Association is concerned, and so far as that item of unfinished business is concerned, there is no unfinished business now. The American Medical Association has distinctly refused to have anything to do with the subject, and now we are in the condition we were in before the broaching of the subject. The subject was entirely mine; brought up entirely by me, originally in the American Medical Association, and so far as I am concerned it has been entirely defeated and entirely frustrated. It was brought up here with the supposistion that the American Medical Association would not take the action it has done. Now, how far the object which we all have in view—both the American Medical Association and this Association—how far the object of obtaining a better Pharmacopoeia is concerned, must be a matter of individual opinion. A large number of the physicians and pharmacists of the United States think we have a good enough Pharmacopoeia. It is certainly good enough for me, but it is certainly not good enough for my appreciation of the want of a Pharmacopoeia to the American Medical Association and the American Pharmaceutical Association. The whole subject of the Pharmacopoeia seemed to me to require reconstruction and reform, and I undertook that subject with hesitation but yet earnestly and carefully, and with the least possible personality, and proposed a method of reform and a plan for discussion. This soon brought upon me and my proposition an amount of abuse of a character so personal and intemperate as to be extremely disagreeable, and, therefore, I am now ready to leave the matter entirely and turn my attention to something better than setting up for a reformer, even though still convinced of the necessity of the reform. If this subject be unfinished business from last year, it is, so far as I am concerned, now finished by being defeated, and it may now be dropped."

The report was received, and the Association, while recognizing that an honest difference of opinion as to the advisability of the plan suggested by him might well exist among its members, nevertheless tendered him a vote of thanks "for his earnest efforts.... to inaugurate an improvement in the plan of the revision of the U. S. P."* This appears to have been the last meeting of the A. Ph. A. which Dr. Squibb attented.

At this critical junction, Dr. Fr. Hoffmann, who had been prevailed upon by Dr. Henry Menninger, Mr. A. E. Ebert and others, advocated that it was the duty of the A. Ph. A. to act because of the failure of the A. M. A. The reasons for the necessity of action are so well stated in the resolution offered that it appears proper to unearth the entire document from the Proceedings of the A. Ph. A.†

"Mr. President and Gentlemen: In regard to the Pharmacopoeia question, which now engages the interests and desires of the pharmaceutical profession so much and so widely, I beg to offer a few brief remarks.

"Having received my professional education in a country where the national Pharmacopoeia bears the stamp of governmental authority and the force of law to both the physician and the pharmacist, I have all the years observed, with special interest, how strictly and faithfully pharmacists in general, throughout the United States, recognize and are guided in practice by our Pharmacopoeia, which has no other than a self-constituted authority;

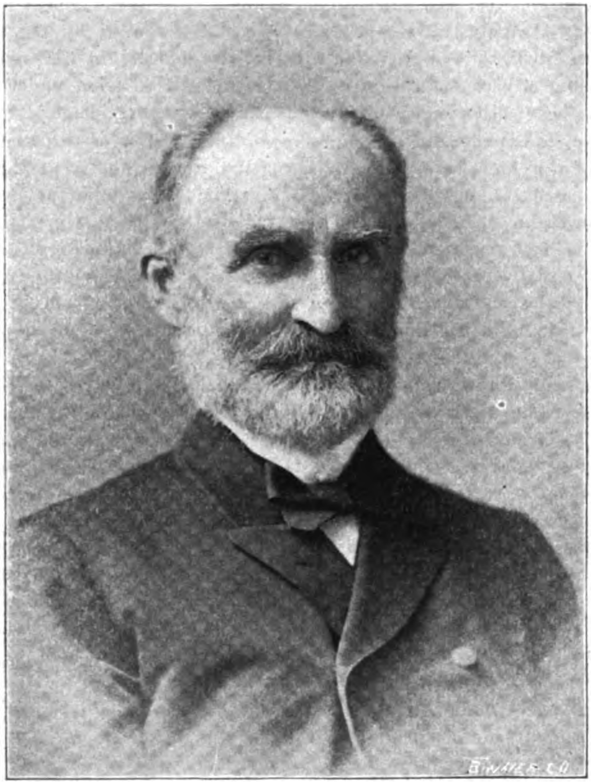
---

* Proc. A. Ph. A., 25, p. 582.

† Ibidem, pp. 582—584.

while, on the other hand, practitioners of medicine, to a great extent, do neither evince much or any interest in the Pharmacopoeia, nor do they use the same or care for its revisions and maintenance.

"In fact, the evidence is continually accumulating that the Materia Medica of the Pharmacopoeia is extensively and irrespectively ignored by a very large number of physicians, in preference to semi-proprietary preparations and ready-made specialities, so much so that it may not be saying too much that the descriptive price-list of the manufacturers of coated and compressed pills, of granular salts, of fancy elixirs, and other ephemeral novelties of commercial speculation and of problematic value, constitute, to a large extent, what may be called the Pharmacopoeia of many physicians of our day and land. Others aver that they do not need a Pharmacopoeia, since they carry along, in the various editions of the physicians' pocketbooks, the comparatively small number of standard formulas of the common galenical pre-


FR. HOFFMANN.

parations, their strength and dose, and that, beyond that and the Dispensatory or other works of reference, the practitioner of medicine can dispense with the present Pharmacopoeia.

"Moreover, every one of you, by his own experience will be aware of the fact that a large number of eminent and accomplished professors, writers and practitioners of medicine throughout the land, for various reasons, share the opinion that the preparation and management of the Pharmacopoeia and its revisions are now better and more properly left to the profession of pharmacy. This view has strongly, although indirectly, been indorsed by the action of the American Medical Association at its recent meeting in Chicago, by explicitly refusing any consideration of pharmacopoeial revision under the plea that 'this subject is thoroughly inappropriate to the Association.'

"Does this not, under such circumstances, and in view of the striking lack of interest of the American Medical Association, and evidently of the medical profession in general, in pharmacopoeial revision, seem doubtful if the profession of medicine, at the decennial meeting of the Pharmacopoeial Convention in 1880, will be represented at all? And if so, the question may arise whether a sporadic representation by a comparatively small number of medical schools and local societies, as has been the case in the past, can be regarded as commensurate with the importance of the subject, the status of American medicine, and the extent of the country.

"In this respect the profession of pharmacy, although still in a minority representation when the total number of the pharmacists of the country and of the local societies is taken into account, is far more adequately represented in the American Pharmaceutical Association. In regard to the Pharmacopoeia and its revisions, it certainly takes a much higher and more interested standpoint than the American Medical Association has done. Now since the profession of medicine, through its national representative body, has distinctly declined any share of the work of pharmacopoeial revision, will not this finally fall to the lot of pharmacy? And furthermore, when it comes to real work, will not all so-called representation henceforth, as in the past, have to yield to talent and skill and leave the labor to a few competent and experienced experts, irrespective of their special occupations?

"The necessity of an earlier revision of the present Pharmacopoeia has repeatedly been urged, inside and outside of this Association. An elaborate and mature proposition for a new departure for such revision by our distinguished fellow-member, Dr. Squibb, stands on record before the profession and the land, and has met, on the whole, with due consideration both here and abroad. Can American pharmacy afford to drag along much longer with its present Pharmacopoeia, not fully commensurate with the advanced state of Materia Medica and the practice of pharmacy? Can the American Pharmaceutical Association, with its growing strength and influence, afford any more to be ignored by the National Pharmacopoeial Convention, and to remain inactive while the vital question of pharmacopoeial revision stands before the profession? Will this Association, representing as it does all the incorporated colleges and schools of pharmacy, and all the pharmaceutical State and local associations of the country, continue to play, in the preparation and maintenance of the standard guide of the practice of pharmacy, that subordinate or rather negative part to which it in the past, and to which its present unofficial committee on pharmacopoeial revision have been doomed? Or has not, in the growth and history of this Association, and in the drift and advance of American pharmacy, the time arrived when this Association, as the foremost exponent of American pharmacy, and as the proper and competent custodian of the interests and status of both the profession and the Pharmacopoeia, is entitled and in duty bound to vindicate its prerogative by henceforth assuming among its objects and aims a more active participation in both the labor and management of the revision and publication of the Pharmacopoeia?

"Therefore, in order to bring this matter properly before the Association, I beg in conclusion to offer the following preamble and resolution:

"Whereas, The plan and method adopted for the elaboration of the first edition of the United States Pharmacopoeia, and subsequently continued for its decennial revision, in consequence of the improved means of intercourse, and, moreover, by the altered conditions, resources, and requirements of the arts, sciences, and the practice of medicine and pharmacy, require a reform, and

"Whereas, The Pharmacopoeial Convention, as yet the only authorized body for revising and publishing the Pharmacopoeia, is so constituted that it meets for this purpose only once in ten years, and has not acted in time, notwithstanding the recognized necessity of an earlier revision, to make the Pharmacopoeia conform with the progress and present status of Materia Medica and the practice of pharmacy, and

"Whereas, The American Medical Association, after a full and elaborate presentation of this subject, and of a mature plan for action, at its recent meeting in Detroit has signally failed to evince due interest in or any willingness for co-operation in the important subject of pharmacopoeial revision, by indefinitely postponing the proposed project; therefore,

"Resolved, That the President of this Association appoint a committee of five to take into consideration the advisability and feasibility on the part of the American Pharmaceutical Association, as the national representative organization of the profession of pharmacy, to prepare a complete Pharmacopoeia, which may be submitted to the criticisms of the medical and pharmaceutical professions and may be proposed to the final Committee of Revision, and that that committee be instructed to report early at the next session, so as to leave time for definite action at the meeting."

Some members regarded the third preamble as unwarranted criticism on the action or non-action of the A. M. A. As a result of a lengthy discussion on an amendment to strike out all references to that association, the resolution finally was adopted, a change of wording in the offending preamble having previously been made so as to make it read as follows:

"Whereas, The American Medical Association, after a full presentation of this subject and of a mature plan for action at its recent meeting at Chicago has failed to take any action in reference to the revision of the Pharmacopoeia by indefinitely postponing the proposed project; Therefore, Resolved," etc.

At the close of the session the following committee was appointed in accordance with the adopted resolution; viz: M. L. Peixotto of New York, Joseph P. Remington of Pennsylvania, G. F. H. Markoe of Massachusetts, A. E. Ebert of Illinois, and T. Roberts Baker of Virginia.

At the next session the "Permanent Committee on the Pharmacopœa of the A. Ph. A.," which in three years had succeeded in organizing itself but had accomplished little more, asked for its resignation.*

The resignation was accepted "with thanks."

At the same session, the committee to which the above resolution had been referred, made the following report:*

"The committee appointed to consider the proposition contained in the resolution offered at the previous session, to the effect that the American Pharmaceutical Association prepare a Pharmacopoeia which may be submitted to the criticism of the medical and pharmaceutical professions, and proposed to the final Committee of Revision of the National Convention, report that they believe that such action is advisable at this time, and they offer the following resolution:

"Resolved, That the Association appoint a Committee on the Revision of the United States Pharmacopoeia, consisting of fifteen members who shall, by a plan to be determined by themselves, be instructed to prepare the text of the proposed new Pharmacopoeia, and that they report progress at each subsequent meeting, and finally lay before the Association, at its meeting in 1879, a complete result of its labors."

In the lengthy discussion which followed, Prof. Maisch and several others expressed rather gloomy views as to their expectations of the result of the work to be undertaken by the new committee. Dr. Rice, while not over sanguine, was hopeful, as were Messrs. Ebert, Menninger and Remington. In place of scattered attempts at revision by the several colleges, a united effort was to be made in the future.

The motion to adopt the report being carried, the following committee was appointed by the chair at the next meeting.*

---

* Ibidem, p. 552.
* Ibidem, p. 553.
* Ibidem, p. 569.

"Charles Rice, Frederick Hoffman, and P. W. Bedford, of New York; John M. Maisch, Joseph P. Remington, and Charles Bullock, of Philadelphia: G. F. H. Markoe and S. A. D. Sheppard, of Boston; John F. Hancock, Baltimore; A. E. Ebert, Chicago; C. Lewis Diehl, Louisville; E. S. Wayne, Cincinnati; W. H. Crawford, St. Louis: Charles Mohr, Mobile, Ala.; Emlen Painter, San Francisco, Cal.

"On Motion of Mr. Hoffmann, the name of the President was added to the committee, and on motion of Mr. Sheppard, the chairman was authorized to draw upon the Treasurer of the Association for the necessary expenses of the committee to an amount not exceeding fifty dollars."

The Toronto meeting had been held early in September. Within a month after adjournment, the chairman of the new committee had effected a meeting of the New York and Philadelphia members, and a circular had been prepared which was distributed, not only to the members of the committee, but to others as well, for "friendly suggestions and criticisms." Like the resolution presented at Toronto by Dr. Hoffmann, this first circular of the late chairman of three revision committees marks an important period in the history of pharmacopœial revision and is, therefore, reproduced with the omission of details.

At the late meeting of the Association at Toronto, a committee was appointed for the purpose of "preparing a complete Pharmacopoeia, which may be submitted to the medical and pharmaceutical professions, and which shall be laid before the final Council of Revision" (of the Convention of 1880). The short time intervening before that date makes it necessary that work should be begun at once, and in a systematic manner, and that each co-laborer should promptly enter upon his share of the labor. In order to save time, the six members residing nearest each other, namely, those of New York and Philadelphia, have discussed the general principles which should be followed in the preparation of the new Pharmacopoeia, and which it is hoped will meet the views of the other members of the committee, and of the profession at large.

General Principles.

1. The present division into Materia Medica (Primary and Secondary List) and Preparations shall be abolished, and all articles shall be mentioned in **one** alphabetical order, retaining, however, such headings as Acida, Aquae, Decocta, Infusa, Extracta, etc., wherever it will be found useful to give general directions referring to the whole class. At the same time, all formulae for the preparation of single members of each class shall be made complete in themselves.

It has been suggested to follow the lead of foreign pharmacopoeias in placing the name of the **part** of a plant in front, so as to make classes of Flores, Folia, Radices, etc. This alteration being one, which may be made at any time, it is left open for consideration and discussion.

2. It being advisable to have the Pharmacopoeia rather too full than deficient. it is proposed not to omit any article at present officinal, but to leave the responsibility of cancelling with the final Committee of Revision. A list of "Remedies to be discarded" is, however, to be submitted to the latter.

CHAS. RICE.

3. The following is a **preliminary** list of new drugs and new preparations, comprising most of those which have been recommended for reception into the new Pharmacopoeia during the last ten years. Some of them, however, are of questionable value, and are only mentioned to draw out the opinions of others. Most of them are distinguished by a sign of interrogation [?]. The first name is the proposed officinal Latin name.

Crude Drugs:
Chemicals:
Pharmaceuticals:

4. To all crude drugs, short and concise descriptions should be added, sufficient to indicate the distinctive characteristics visible to the naked eye; and, when necessary, such as are visible under an ordinary good pocket-lens. Common admixtures or sophistications should be mentioned, and the differences pointed out. The botanical names of plants should be accompanied by the name of the determining botanist, and by the name of the natural family.

5. Chemicals, except those where differences of preparation may produce different results, shall only be described and defined by tests of identity and purity. Processes appear to be required only in the following cases:

6. Temperature shall be expressed both by degrees of Centigrade, and by degrees of Fahrenheit.

7. Under the title of those chemicals which admit of it, their formulae after the new notation, and their atomic weights shall be given.

8. All measures of capacity shall be abondoned, and quantities shall be expressed only in parts by weight. In the case of liquid galenical preparations the carrying out of this rule is difficult, if it is at the same time required to preserve the present strength of these preparations. As a general rule, it may be set down that those tinctures, wines, etc., where a slight variation of dose is of no account, should all be made of uniform strength, even if differing from that at present in use. But in the case of very active preparations, such as Tinct. aconiti, opii, nucis vomicae, veratri viridis, etc., the present strength is to be as nearly as possible retained.

In the case of fluid extracts, it is proposed to ascertain from a series of very carefully made samples, representing minim for grain, and prepared from drugs of known hygrometric condition by means of menstrua of known strength, the weight of the product obtained, which figure shall be made use of, in the new formulae, to indicate the weight of the finished extract. Although the figures obtained for the different fluid extracts will vary among themselves, still the result will be that, while these preparations conform to the general rule of being made by weight, they will nevertheless represent the drug, minim for grain.

9. Under all officinal articles, which, as such, are used as remedies, the average adult dose should be stated. In case the remedy has a peculiar active effect upon infants (as in the case of opium), the maximum infant dose should also be added. Perhaps in this manner:

Dose:—Single: — grs. Daily: — grs. Maximum dose for infants: — grs.

10. The following tables are suggested to be added to the Pharmacopoeia:

a. A table of the maximum single and daily doses of powerful remedies.

b. A table of poisons and antidotes.

c. A table of the solubilities of the officinal chemicals in water and alcohol, at 15.5° C. (60° F.), and at their boiling point.

d. An alcoholometrical table (Dr. Squibb's is the most useful).

e. Tables of the spec. grav. of the officinal liquid acids. (Wherever possible, specific gravities should be given both for 15.5° C. (60° F.), and for 25° C. (77° F.).).

f. A table of reagents in proper dilution, and a list of normal volumetric solutions.

g. A table of the relationship between weight and measure of all liquid preparations. This would facilitate the introduction of the system of prescribing by weight alone. The table might have this shape:

Apothecaries'.		Name of Preparation.	Metric.	
1000 grs. measure.	1000 min. weigh.		1000 gms. measure.	1000 cc. weigh.*
777 min.	1287 grs.	Liq. Ferri Chlor............	738 cc.	1355 gm.
842	1187	Glycerina........................	800	1250
1447	691	Ether fortior..................	1374	728

h. A table of the quantities of the chief constituents of the important mineral waters, which are used medicinally.

i. A comparative table of the strength of powerful galenical preparations of the principal foreign pharmacopoeias in this country.

k. A table exhibiting the differences in strength of the preparations as made by the previous and by the new pharmacopoeia.

11. All contributions from the members of the Committee should be written plainly, on one side of foolscap paper. Formulae which are transcalculated into parts by weight should be sent as follows:

Linimentum Saponis.	Original Formula.	Exact Weight.	Approximation.		
Soap..................................	4 troy oz.	1920 grs.	19	or simpler	20
Camphor...........................	2 "	960 "	10		10
Oil Rosemary....................	½ fl. oz.	207 "	2		2
Water................................	6 "	2734 "	27		25
Alcohol..............................	2 pints.	12176 "	122		120

The work which is to be done by the Committee naturally divides itself into three branches: Pharmacognosy, Chemistry, and Pharmacy. It has been thought best to form a sub-committee of three, to be called Expert Committee, each member of which will take charge of one of these branches, and will invite the co-operation of other members of the General Committee. It augurs well for the result that Prof. J. M. Maisch of Philadelphia, and Dr. Fred. Hoffmann of New York, have agreed to take charge, the former of Pharmacognosy, and the latter of Chemistry. The department of Pharmacy, which contains still some open questions requiring settlement, the undersigned will for the present retain; besides, he will take charge of the general management, and of the codification of whatever is contributed.

---

* The figures in this column at the same time denote the specific gravities of the preparations.

The members of the Committee, as well as the members of the Association at large, have to express their deep regret that the services of the man who has done more than any other to bring about a revival in pharmacopoeial matters, and to elevate American pharmacy—Dr. Ed. R. Squibb—could not be secured, in an official capacity, for the purposes of this Committee. His reluctance to serve, we are authorized to say, is not due to diminished interest in the Pharmacopoeia, nor to unwillingness to work for it in the way now to be tried by this Committee, which has already had his counsel fully and freely given in the past, and has every assurance of receiving it in the future; on the contrary, it is owing to his conviction that it would not be consistent to take a prominent part in a movement led by the American Pharmaceutical Association, which had been received with such marked disfavor when proposed to the American Medical Association.

The first "Report of the Committee on the Revision of the U. S. Pharmacopœia"* is a totally different document from that of the previous committee which required three years to effect its organization. It tells of meetings held; of the subdivision of labor; of cooperation by the U. S. Secretary of State to secure "official information as to the intentions of foreign governments in regard to proposed revision of their Pharmacopœia"; of assistance received from such men as Squibb and Prescott, who were not members of the committee; of actual revision work already accomplished.

The impossibility, however, of preparing a "complete" work is becoming apparent and the proposition "to submit the complete work to the pharmaceutical and medical profession" appears to be impracticable because of the expense of publication.

The report is supplemented by a statement of the "general principles adopted in the revision of the U. S. Pharmacopœia"; and a lengthy "Report on fluid extracts" by C. Lewis Diehl.

Other papers by Squibb† and Prescott‡ bearing on pharmacopœial revision and announced in the report are printed as "special essays."

At the close of this report, Dr. Rice requested to be relieved of the chairmanship of the committee, because of impaired health. Rising to second a motion to accept Dr. Rice's resignation, Prof. Maisch stated:

> "That the work on the Pharmacopoeia has advanced so far as it has been presented, is mainly due to his exertions, and while he seems to be disposed in his report to give all the credit to the members of the committee, I will say for one, that very little of that credit is due to me, for I have been very much occupied with other labors. It is principally due to that energy and wonderful talent of organizing possessed by Mr. Rice that it has reached its present advancement."

---

* Proc. A. Ph. A., 26, p. 668

† Ibidem, pp. 708, 754.

‡ do. pp. 806, 826.

At a later session, Mr. Louis Dohme was appointed chairman of the Committee,* but even before the Proceedings were printed it was ascertained, that he could not serve because of an affection of the eyes. Dr. Rice's health having improved somewhat, he allowed himself to be persuaded to continue as chairman.† This interregnum without an active chairman left but four months for work before the Indianapolis meeting in 1879.

Though dissapointed in some respects, the chairman reports at this meeting‡ a reasonable amount of progress. "If the committee had accomplished nothing more than to keep alive the interest in the forthcoming revision of the Pharmacopœia, it would not have been in vain. But the results are indeed much greater, though not all in a condition to be laid before the Association at this meeting."

As a result of the years work, a number of papers by members of the committee and others, including Professor Lloyd, are presented. Specimens of the revised text are also submitted.

The following list of papers was read and published in the Proceedings as indicated:

> "On Diluted Alcohol, by Professor William T. Wenzell (see p. 705); On Spirit of Nitrous Ether (p. 723); On Citrate of Iron and Ammonia (p. 741); On Citrate of Iron and Quinia (p. 743); on Tartrate of Iron and Potassium (p. 744); and on Hydrated Oxide of Iron (p. 740), the last five papers being from Mr. J. U. Lloyd. The several papers were accepted, and referred to the Executive Committee.
>
> "Professor Diehl read an essay entitled "Second Report on Fluid Extracts" (see p. 727), and illustrated the subject by diagrams."

The Association was so impressed with the work done by the Committee that a resolution to publish it, "provided the expenses be defrayed by the various colleges of pharmacy and pharmaceutical associations," was carried.§

Some of the objections raised against this proposition, especially those by the Secretary, evidently carried but little weight. The Committee appointed "to receive subscriptions and publish the report" consisted of Dr. Ross, Dr. Rice and Prof. Diehl.¶

The appeal, issued Oct. 1st, 1879, met with such favor that in less than a month the chairman of the publication committee had a sufficient sum of money in his hands to warrant the publication of the report of the revision committee. At Saratoga Springs in 1880, this committee reported two thousand copies printed which had been ready for distribution early in February of that year; also a balance of $78.79, which was offered to the Centennial fund.*

---

* Ibidem, p. 917.
† Ibidem, p. 917, footnote.
‡ Proc. A. Ph. A., 27, p. 667.
§ Ibidem, p. 797.
¶ Ibidem, p. 808.

As to the fate of the published report before the convention at Washington in May 1880, the remarks of the late Mr. Sloan, then President of the association, may suffice. From his address the following paragraph is taken:†

"The notable event of the year to us has been the meeting of the convention to revise the Pharmacopœia. We as an association, have just cause to feel a pride in the result of our efforts in this matter. And I assure you my power of expression fails me in my desire to render to our Committee on Revision a tribute commensurate with their arduous efforts. The fact of their report having been accepted as the basis for the final revision of the Pharmacopœia, almost as an entirety, must of itself be very gratifying, not only to the committee, but to the Association also. In addition, the majority of the Committee on Final Revision, and all the officers of the committee, are members of this Association. In consideration of the fact that this was the first report offered to the convention by this Association, its hearty acceptance may readily be received as evidence of its worth. As a mark of appreciation that is due to them for their eminent services I earnestly recommend the passage of a vote of thanks to the Committee on Revision. In this connection it is eminently proper that a recognition be made of the labors of the special committee under whose supervision the report of the above committee was published."

These memorable events in the history of American pharmacy are summed up in a brief paragraph of the historical introduction to the present U. S. Pharmacopœia.

"Important changes were directed at this meeting to be made in the Pharmacopœia, the more prominent ones being the following: all articles were to be arranged in alphabetical order; the new chemical nomenclature was to be introduced; quantities were to be stated in "parts by weight," and descriptions of crude drugs and of chemicals were to be made more comprehensive and exact. Numerous tables were also directed to be added to the work. A Committee of Revision was elected, consisting of twenty-five members, and its powers and duties were expressly defined."

It is not all probable that this paragraph conveys much of the true significance of the events of 1877—1880, as related above, to anyone but the few who took an active part in the renaissance of the revision of the U. S. Pharmacopœia.

---

* Proc. A. Ph. A., 28, p. 528.

† Ibidem.

The Sesquiterpenes.*

A monograph by *Oswald Schreiner.*

13. Guajene.

By dehydration of guajol from oil of guaiac wood, Wallach and Tuttle[1] obtained a sesquiterpene, which has not been identified with any of the known sesquiterpenes, but has not been sufficiently studied to be at all characterized as an individual.

Preparation. These chemists prepared the hydrocarbon as follows: 10 gr. of guajol were heated with an excess of zinc chloride to 180° for about an hour. The colored product of the reaction was then distilled with steam. The blue oil obtained was dried with solid caustic alkali and distilled in a vacuum. The fraction boiling at 124—132° (13 mm.) was collected, but analysis showed that the hydrocarbon was not quite pure.

Properties. The fraction thus obtained is blue, but it must not be assumed that this is necessarily due to the hydrocarbon. The production of small amounts of oxygenated compounds from the readily oxidized sesquiterpene are probably responsible for the coloration. According to Wallach and Tuttle this blue color disappears when the hydrocarbon is kept for some time in contact with metallic sodium.

The sesquiterpene has the following physical constants:

B. p. 124—128° (13 mm.); $d_{20^\circ} = 0.910$; $n_D = 1.50114$.

No chemical work is reported.

Sesquiterpene hydrate yielding guajene. Guajol. Schimmel and Co.[2] obtained as the principal constituent an alcohol from guaiac wood oil. As the latter has erroneously been brought into commerce as champaca wood oil, the alcohol has also been designated as champacol.[3] The compound was more closely studied by Wallach and Tuttle[4] in 1894.

---

* Continued from Pharm. Archives, vol. 6, p. 141.

[1] Ann., 279, p. 396.

[2] Ber. v. S. & C., April 1892, p. 42.

[3] Merck & Co. Geschäftsbericht, Jan. 1. 1898; Chem. Ztg. Repert., 17, p. 81; Ber. v. S. & Co., April 1898, p. 38; Ann., 279, p. 395.

[4] Ann., 279, p. 395.

Preparation. Shortly after distillation the viscous guaiac wood oil will solidify completely to a mass of crystals of guajol. Wallach and Tuttle purified the crude alcohol as follows: The crude material was first distilled in a vaccuum. The yellowish syrupy portion collected at 155—165° (13 mm.) soon solidified. The crystalline mass was mixed with ether to form a thick paste which was spread on porous plates. By recrystallizing from alcohol the guajol could be obtained in a pure condition. Analysis showed it to be a sesquiterpene hydrate.

Properties. Guajol crystallizes readily in large, well developed, transparent prisms. When pure it shows the following properties:

Schimmel & Co.: M. p. 91°; b. p. 148° (10 mm.) laevogyrate.

Wallach and Tuttle: M. p. 91°; b. p. 288°.

Especially characteristic for guajol are the brilliant color changes which are produced by dehydrating agents. Dilute sulphuric acid, which acts readily on patchouly alcohol, does not act on guajol, but phosphoric pentoxide abstracts water at a high temperature, developing a deep red color, and giving rise to a hydrocarbon and much resinous material. The same reaction takes place, but with better results, when chloride of zinc is employed as has been described above.

According to Schimmel & Co.[5] guajol yields with acetic acid anhydride a liquid acetic ester, boiling at 155° (10 mm.). Guajol can be regenerated from it by saponification.

14. Gurjunene.

Werner[1] in 1862 examined oil of gurjun balsam and found it to consist principally of a hydrocarbon $C_{20}H_{32}$, boiling at 255°, having a specific gravity of 0.9044 at 15° and a rotation of —10°. Two vapor density determinations made by Kohlrausch[2] in 1879 show the formula to be that of a sesquiterpene, $C_{15}H_{24}$. According to Flückiger it absorbs hydrochloric acid but yields no crystalline hydrochloride. The chemical work done on this sesquiterpene is restricted almost entirely to color reactions when treated with acids. Flückiger gives the following test for the identification of gurjun balsam oil. The oil when dissolved in about twenty times its weight of carbon disulphide gives with a drop of a cold mixture of equal parts of sulphuric and nitric acids (1.180) a bright red color which gradually changes to violet.

---

[5] Ber. v. S. & Co., April 1892, p. 42.
[1] Ztsch. f. Chem., 5, p. 588; Jahresb. d. Pharm., 1863, p. 50.
[2] Flückiger, Pharmacognosie, 3rd ed., p. 102.

Although gurjun balsam oil consists almost wholly of sesquiterpenes it is by no means certain that only one sesquiterpene is present. The widely varying rotatory powers of different samples of oil, from $\alpha_D = -35°$ to $-130°$ indicate that the oil may not be a chemical unit. In one case[3] the rotation was even strongly to the right.

Without characterizing the sesquiterpene, Heine & Co.[4] gave it the name of gurjunene. The product made by them had the following properties:

B. p. (?); $d_{15°} = 0.920$; $\alpha_D = -136°$.

See also Sesquiterpene from Minjak Lagam Balsam Oil.

15. Heveene.

Heveene[1] is obtained by the destructive distillation of cautchouc and is but little investigated. Beilstein[2] includes it among the sesquiterpenes, giving its boiling point as 255—265°. It absorbs hydrochloric acid gas, forming a hydrochloride corresponding to the formula $C_{15}H_{24}HCl$, but this compound does not crystallize and decomposes readily.

16. Humulene.

Synonyms.

Diterpene (erroneously).
Terpene of poplar bud oil.
Humulene.

Based on a vapor density determination Piccard[1] in 1874 called the hydrocarbon of poplar bud oil a diterpene. In 1899 Fichter and Katz,[2] who identified the hydrocarbon as humulene also speak of it as the terpene of poplar bud oil. The name humulene was given to the charactized sesquiterpene by Chapman[3] in 1895, after the name of the plant, *Humulus lupulus*, yielding the oil in which it was first found.

---

[3] Dymock, Warden and Hooper, Pharmacographia Indica, 1890, I, p. 193.

[4] List of products exhibited at Paris, 1900.

[1] This name was given to the hydrocarbon by Bouchardat (Journ. d. Pharm., 1837, p. 454; Ann., 27, p. 35) from *Hevea guianensis*, yielding cautchouc.

[2] Handb. d. org. Chem., III, p. 538.

[1] Ber., 7, p. 1486.

[2] Ber., 32, p. 3183.

[3] Journ. Chem. Soc., 67, p. 54.

History and General Discussion.

In 1895 Chapman[4] isolated from oil of hops, a sesquiterpene which differed in its physical properties from any of the known sesquiterpenes, although in some respects its derivatives resembled the corresponding compounds of caryophyllene as far as then known. This sesquiterpene Chapman calls humulene. In 1899 Fichter and Katz obtained this same hydrocarbon from the oil of poplar buds.

The further characterization of caryophyllene by Schreiner & Kremers[5] shows conclusively that humulene is quite distinct from caryophyllene. Chapman's humulene nitrosochloride melted at 164 to 165° and caryophyllene nitrosochloride at 161—163° as reported by Wallach. This led Chapman to think that the two compounds might be identical, but he could not obtain a hydrate from his sesquiterpene under the same conditions that caryophyllene readily yielded this compound. As no other compounds of caryophyllene were known at that time, further comparisons could not be made. With other known compounds now at command a comparison shows that the two sesquiterpenes cannot be identical, although the great similarity in their chemical behavior is striking. Both yield all three nitroso derivatives. Moreover, the nitrosite in each case is blue and yields an isomeric white variety. In the case of caryophyllene this white compound is obtained by the action of light, whereas the white humulene iso-nitrosite was obtained by repeated crystallizations or by heating for some time with alcohol. Even with humulene the change is possibly due more to the action of light during the process of recrystallization and boiling, than to the action of the alcohol. The great similarity in the behavior of the two compounds makes it highly probable that the blue humulene compound will react similarly on exposure to light as does the caryophyllene derivative. Whether or not a β-compound can be obtained from humulene as from caryophyllene by exposing a benzol solution of the nitrosite to light, experiment alone can decide.

A further apparent analogy between the two hydrocarbons was that both yielded only liquid addition products with hydrochloric acid, but this no longer holds, since the caryophyllene compound has been obtained in a crystalline form. However, it is also probable that a crystalline humulene dihydrochloride is obtainable in a manner similar to that by which the caryophyllene derivative was prepared.

---

[4] Journ. Chem. Soc., 67, pp. 54, 780.
[5] Pharm. Archives, 1, p. 209 et seq.

The derivatives of the two hydrocarbons, although so similar, show by their melting points that they cannot be identical. The melting points of the nitrosochlorides, as in the case of the terpenes, cannot be used, as it is rather a decomposition point than a melting point; but the melting points of the other compounds, especially of the nitrosite and its derivatives, are characteristic. Caryophyllene nitrosite melts at 113°, whereas the corresponding humulene derivative melts at 120—121°; the white compound from caryophyllene nitrosite melts at 112—114°, humulene iso-nitrosite at 165—168°. The nitrolbenzylamine bases show still more conclusively the differences between these hydrocarbons. The base obtained from the nitrosochloride melts in the case of the caryophyllene compound at 167°, in the case of the humulene compound at 136°. Moreover. Chapman obtained the same piperidine base from both the nitrosate and nitrosochloride, whereas caryophyllene nitrosate and nitrosochloride yield different compounds with benzylamine.

Occurrence.

Humulene is not widely distributed. It has been found in only two oils, but these come from plants belonging to different families. It is not improbable that with further study humulene will be found in other oils as well.

Salicaceæ.

Populus nigra. Oil of Poplar Buds.

Piccard[6] in 1873 found oil of poplar buds to boil principally between 260 and 261° and to correspond to the formula (C_5H_8). Its specific gravity was 0.9002. An analysis of a sample of oil which had stood for several weeks showed it to contain 3.48 p. c. of oxygen. In a later communication[7] he reports the hydrocarbon as a diterpene $C_{20}H_{32}$, drawing his conclusion from a vapor density determination by Dumas' method, which would, of course, give too high a result with compounds of this nature. The fraction had a rotation of +1.9° in a 100 mm. tube.

In 1899 Fichter and Katz[8] examined the sesquiterpene from oil of poplar buds. They obtained a fraction 132—137° (13 mm.),

---

[6] Ber., 6, p. 890.
[7] Ber., 7, p. 1486.
[8] Ber., 32, p. 3183.

263—269° (760 mm.) having the specific gravity 0.8926 and a rotation of + 10° 48′ in a 200 mm. tube. Although the constants of this fraction do not agree with those of humulene as found by Chapman, the preparation of characteristic derivatives showed that it contained humulene. The authors are of the opinion that a second sesquiterpene accompanies the humulene in poplar bud oil.

The humulene was identified by the preparation of a nitrosochloride, m. p. 164—170°; a blue and a white nitrosite, m. p. 127 and 172° respectively; a nitrosate, m. p. 162—163°, a nitrolpiperidine and a nitrolbenzylamine base and their hydrochlorides.

Moraceæ.

Humulus lupulus. Oil of Hops.

In 1893 Chapman[9] described a sesquiterpene obtained by fractional distillation from oil of hops. In 1895 this was followed by two more articles in which the sesquiterpene was characterized by the preparation of several characteristic derivatives. Fraction 168—173° (60 mm.), constituting nearly two thirds of the oil used, was purified by boiling with sodium under diminished pressure and rectified by distillation. The sesquiterpene thus obtained Chapman called humulene because it differed in its properties from any of the known sesquiterpenes. The first of the articles mentioned is on oil of hops, but includes the preparation of humulene nitrosochloride by conducting nitrosyl chloride into a chloroformic solution of the sesquiterpene, as well as the preparation of the piperidine nitrolamine base from the nitrosochloride. Attempts to prepare a crystalline bromide or hydrochloride proved fruitless. The second article is on humulene derivatives in particular and includes the preparation of the nitrosate, isonitrosite, nitrolbenzylamine base and the hydrochloride of this as well as of the nitrolpiperidine base.

Preparation.

Humulene, like caryophyllene, has not been obtained in a pure state by regeneration from any of its derivatives. It is prepared by fractional distillation from oil of hops. Chapman[11] collected fraction 168—173° (60 mm.), corresponding to 256—261° (760 mm.). This fraction was purified by repeated distillation over sodium under diminished pressure, until the metal remained bright. Thus purified it boiled at 166—170° (60 mm.) and the analysis showed it to be free from oxygenated compounds.

---

[9] Proc. Chem. Soc., 1893, p. 177.
[10] Journ. Chem. Soc., 67, pp. 54, 780.
[11] Journ. Chem. Soc., 67, p. 59.

Physical Properties.

Of the physical constants given, only those of Chapman can be considered as characteristic of the pure hydrocarbon. The results of Piccard and of Fichter and Katz apply to crude humulene fractions. Even the slight rotatory power noticed by Chapman is probably due to a trace of an active substance accompanying the humulene, as another sample, prepared from the same source in the same manner, had a somewhat greater rotatory power. Humulene may, therefore, be considered as being inactive when perfectly pure. The physical constants found were:

Piccard (1873): B. p. 260—261°; $d = 0.9002$; $\alpha_D = +1.9°$.

Chapman (1893): B. p. 261—265° (corr.); $d_{\frac{15°}{15°}} = 0.8987$; $d_{\frac{20°}{20°}} = 0.8955$; $[\alpha]_D = +1.2°$; $n_{H\alpha} = 1.4978$.

Chapman (1895): B. p. 166—170° (60 mm.), 263—266° (760 mm.); $d_{\frac{15°}{15°}} = 0.9001$, $d_{\frac{20°}{20°}} = 0.8977$; $\alpha_D = -0.5°$; $n_D = 1.5021$, $n_{H\alpha} = 1.4978$.

Fichter and Katz (1899): B. p. 132—137° (13 mm.); 263—269° (760 mm.); $d_{\frac{15°}{4°}} = 0.8926$; $\alpha_D = +5° 24'$.[12]

The molecular refraction calculated from the index of refraction shows humulene to have two double bonds. This is also indicated by the bromine absorption and by the preparation of a liquid dihydrochloride.

Chemical Properties and Derivatives.

Humulene, having two double bonds, is capable of forming a tetrabromide and dihydrochloride or dihydrobromide, but none of these has been obtained in a pure or crystalline condition. It also yields a nitrosochloride, a nitrosate and two nitrosites, the one blue, the other white, as well as nitrolamine bases, derived from these. Nitrosohumulene, which on reduction yields a base, has been prepared, but neither of these compounds has been obtained in a pure and crystalline condition. By means of all these derivatives, humulene is definitely characterized. The compound best suited for identification, however, is the blue nitrosite. From this the white iso-nitrosite can be prepared and probably also the nitrol bases although Chapman and also Fichter and Katz prepared these from the nitrosochloride.

---

[12] According to F. and K. this rotation is due to the presence of a second sesquiterpene.

Humulene readily absorbs oxygen as was shown by Piccard,[13] who analysed the hydrocarbon after standing a few weeks and found it to contain 3.48 p. c. of oxygen. Oxidation with cold aqueous potassium permanganate gave, according to Chapman,[14] carbonic and acetic acids, together with a non-volatile acid which was not identified. When treated according to the hydration method used by Wallach for caryophyllene, no crystalline hydrate could be obtained.

Humulene dihydrochloride, $C_{15}H_{24}2HCl$. Chapman[15] prepared a liquid dihydrochloride by passing dry hydrochloric acid gas into a well cooled solution of humulene in four times its volume of ether. On evaporation of the ether a yellow oil was left, which when purified by washing with cold alcohol and drying, gave on analysis a result agreeing with the formula $C_{15}H_{25}.2HCl$. Attempts to obtain it in a crystalline condition failed, nor could it be purified by distillation under diminished pressure without the loss of large amounts of hydrochloric acid gas. The specific gravity of the impure liquid dihydrochloride was 1.063.

Humulene nitrosochloride, $C_{15}H_{24}NOCl$. Chapman[16] prepared this compound by passing nitrosyl chloride slowly into a well cooled solution of one volume of humulene in three volumes of chloroform. After a time a white crystalline substance separated, the amount of which was increased by adding cold alcohol. The precipitate was collected on a filter, washed with cold alcohol, and dried in a vacuum over sulphuric acid. It is fairly soluble in chloroform and can be obtained from this solution in a more distinct crystalline condition by the addition of alcohol.

Fichter and Katz[17] prepared the nitrosochloride by treating the humulene fraction with amyl nitrite or ethyl nitrite and hydrochloric acid and recrystallized it from benzol or chloroform with the addition of methyl alcohol.

The nitrosochloride is a white finely crystalline substance and is comparatively stable. It melts at 164—165° (Chapman), 164—170°

---

[13] Ber., 6, p. 890.
[14] Journ. Chem. Soc., 67, p. 61.
[15] Journ. Chem. Soc., 67, p. 61.
[16] Journ. Chem. Soc., 67, p. 789 et seq.
[17] Ber., 32, p. 3184.

(Fichter and Katz) with decomposition. With organic bases it yields nitrolamine compounds. Treatment with sodium ethylate changes it to nitrosohumulene.

Humulene nitrosate, $C_{15}H_{24}.N_2O_4$. Chapman[18] prepared this as follows: A mixture of 5 volumes of humulene, 5 volumes of amyl nitrite and 8 volumes of glacial acetic acid was cooled in a freezing mixture to about —15°. To this solution, a well cooled mixture of equal volumes of nitric acid and glacial acetic acid was added little by little, with constant shaking. A white crystalline substance soon formed, the mixture becoming almost solid. Alcohol was now added and after standing in the cold for about an hour, the nitrosate was collected on a force filter and washed with cold alcohol. It was purified by recrystallization from hot benzol.

The nitrosate is obtained in extremely fine, colorless needles, often forming rosettes. It is practically insoluble in alcohol and in ether, but fairly readily soluble in benzol, chloroform, and glacial acetic acid on warming. The purified nitrosate melts at 162—163° with decomposition.

Humulene nitrosite, $C_{15}H_{24}.N_2O_3$. Chapman[19] prepared this compound by adding to a well cooled mixture of equal volumes of humulene and light petroleum ether, a conc. aqueous solution of sodium nitrite, and lastly a volume of acetic acid equal to that of the humulene taken, little by little, with frequent shaking. From the upper hydrocarbon layer deep blue needles soon separated, which, after some hours, were collected and purified by one recrystallization from boiling alcohol.

The nitrosite crystallizes in magnificent blue needles melting at about 120° (Chapman), 127° (Fichter and Katz) with slight decomposition. It dissolves readily in hot alcohol, glacial acetic acid, ether, and chloroform, but is practically insoluble in light petroleum ether.

By repeated recrystallization from alcohol or boiling with alcohol, the blue nitrosite is gradually converted into the white iso-nitrosite, the melting point continually increasing.

Humulene iso-nitrosite, $C_{15}H_{24}.N_2O_3$. The oily mother liquors obtained in the preparation of the blue nitrosite, deposited a second, and even a third crop of crystals. These, after, recrystallization from alcohol were colorless and appear to have the same composition as the blue compound. Chapman considers this as the iso-nitrosite and the blue compound as the true nitroso derivative.

---

[18] Journ. Chem. Soc., 67, p. 781.
[19] Journ. Chem. Soc., 67, p. 782.

This same white compound is obtained by repeatedly crystallizing the blue nitrosite from alcohol, or simply by heating it with alcohol for several hours. During the recrystallization the crystals become paler and finally white, and the melting point gradually rises from about 120° up to 166—168°. It melts with decomposition.

That this behavior of the blue compound is probably due to the action of light, as was observed by Schreiner and Kremers for the corresponding caryophyllene compound, has already been pointed out in the general discussion.

Humulene nitrolbenzylamine, $C_{15}H_{24}(NO)NHCH_2C_6H_5$. Chapman[20] prepared this base by heating humulene nitrosochloride with an excess of benzylamine almost to the boiling point of the latter, and dissolving the product of the reaction in alcohol. By adding a little water the nitrolbenzylamine crystallizes out. It can be purified by recrystallization from alcohol.

This nitrol base crystallizes in bundles of very small needles radiating from a center, which melt at 136° (Chapman) 132—133° (Fichter and Katz).

Hydrochloride. By passing hydrochloric acid gas into a solution of humulene nitrolbenzylamine in dry ether, the hydrochloride of this base separates as a white, granular precipitate. It can be purified by several recrystallizations from boiling water, and melts at 187—189° with decomposition.

Humulene nitrolpiperidine, $C_{15}H_{24}(NO)NC_5H_{10}$. This compound is prepared by Chapman[21] in precisely the same manner as that described for the benzylamine base. It is purified by recrystallization from hot alcohol.

The nitrolpiperidine base is but slightly soluble in cold, somewhat more soluble in hot alcohol. It crystallizes in the form of small, white, glistening plates. Melting point 153° (Chapman) 151 to 152° (Fichter and Katz).

Hydrochloride. The hydrochloride[22] is precipitated by passing hydrochloric acid gas into an ether solution of the nitrolamine. It is purified by recrystallization from boiling water or from alcohol.

---

[20] Journ. Chem. Soc., 67, 781.
[21] Journ. Chem. Soc., 67, p. 62.
[22] Journ. Chem. Soc., 67, p. 780.

From water it crystallizes in hard nodular masses. No melting point is given.

Platinochloride $(C_{15}H_{24}.NO.NC_5H_{10})_2H_2PtCl_6$. This compound is prepared[23] by mixing alcoholic solutions of platinic chloride and of the hydrochloride of nitrolpiperidine. It crystallizes from alcohol in reddish needles, melting at 187—189° with decomposition.

Nitroso- or isonitroso-humulene, $C_{15}H_{24}NOH$. Fichter and Katz[24] obtained this compound by treating humulene nitrosochloride with sodium ethylate. It is a yellow viscous oil, distilling at 185—195° (13 mm.) and has not been obtained in a crystalline condition. By reduction a base was obtained, but it could not be prepared in a pure condition.

Chapman tried a similar reaction with humulene nitrosate but failed to get the product of the reaction in a pure form.

17. Ledene.

Ledene has not been found in nature but is obtained by dehydration from the so-called ledum camphor, found in the oil of *Ledum palustre*. Rizza[1] in 1887, recognized this so-called camphor as a sesquiterpene hydrate, and obtained from it a sesquiterpene by treatment with acetic acid anhydride. Hjelt,[2] in 1895, also obtained the hydrocarbon $C_{15}H_{24}$ and called it ledene.

Preparation. Ledene hydrate splits off water with great ease. Rizza prepared the sesquiterpene from ledene hydrate by heating it with acetic acid anhydride (30 g. to 5 g. of the hydrate) in a tube to 150° for 5 hours. The upper oily layer was well washed with alkali and dried with calcium chloride.

Hjelt prepared ledene by simply warming the hydrate with diluted sulphuric acid (1:1) on a water bath. The upper oily layer was distilled over with steam, separated and dried.

Properties. Ledene is a colorless liquid of a very characteristic odor and having the following properties:

Rizza (1887): B. p. 264 (752 mm.); $d_{0°} = 0.9349$; $d_{19°} = 0.9237$.
Hjelt (1895): B. p. 255°.

The chemical study of ledene is restricted to the statement that bromine is absorbed.

---

[23] Journ. Chem. Soc., 67, p. 781.

[24] Ber., 32, p. 3184.

[1] Journ. d. russ. phys.-chem. Ges., 1887, (1), p. 319; Ber., 20, Ref., p. 562.

[2] Ber., 28, p. 3087.

Sesquiterpene hydrate yielding ledene. Ledene hydrate. Ledene hydrate separates from the water of distillation and also from the oil of *Ledum palustre*. It was obtained by Grassmann[3] as early as 1831 and was later studied by Frapp[4] (1869), Ivanow[5] (1876), Hjelt and Collan[6] (1882), Rizza[7] (1883). Rizza[8] in 1887 and Hjelt[9] in 1895 recognized the compound as a sesquiterpene hydrate.

Preparation. As already mentioned the hydrate separates from the oil on cooling and is also obtained from the water of distillation. It can be purified by crystallization from alcohol, benzol, ether or chloroform. It crystallizes in nice prismatic crystals from these solvents and can also be obtained in the form of long white needles by sublimation.

Properties. The physical constants of ledene hydrate are as follows:

Rizza (1883): M. p. 104—105°.

Hjelt and Collan (1882): M. p. 101°.

Hjelt (1895): M. p. 104—105°; b. p. 282—283°; $[\alpha]_j = +7.98°$ in 10 p. c. alcoholic solution.

As mentioned above ledene hydrate is readily dehydrated to form ledene. Chemically ledene hydrate behaves like a tertiary alcohol. Potassium permanganate does not act upon it. No chemical derivatives have been prepared. Benzoyl chloride appears to act on the hydrate with evolution of hydrochloric acid gas and formation of an oil having the properties of ledene. Phenylcyanate acts upon it and a small amount of a substance melting at 144—145° was obtained by Hjelt, which may have been a urethane. Phosphorus chloride acts on the hydrate in ligroin solution to form a chloride which could not be obtained in a pure condition. Heated with quinoline the chloride gave rise to an oil having the boiling point of ledene, namely 255°.

---

[3] Buchner, Repert. für Pharm., 38, p. 53.

[4] Ztsch. f. Chem., 1869, p. 350; Ber., 8, p. 542.

[5] Russ. Ztsch. Pharm., 1876, p. 577; Jahrb. 1876.

[6] Ber., 15, p. 2500.

[7] Journ. d. russ. phys.-chem. Ges., 1887, (1), p. 319; Ber., 20, Ref., p. 562.

[8] Ber,, 28, p. 3087.

[9] Prot. d. russ. phys.-chem. Ges., 1883, p. 362; Ber., 16, Ref., p. 2311

The Citral Assay of Volatile Oils.*

By *E. Kremers* and *I. W. Brandel.*

II. Modification of Sodium Bisulphite Method.

Burgess & Child* in 1901 tested the four methods for citral assay in lemon oil, generally employed. They state that the bisulphite method as directed in text books is not to be recommended in as much as a strongly acid solution should be avoided. A 40 percent solutition of sodium metabisulphite is most advantageous. Their method is as follows: To 25 cc. of lemon oil add 75 cc. of 40 percent sodium metabisulphite solution and 25 cc. of sodium sulphite (made by exactly neutralizing the sodium bisulphite solution with a 10 percent solution of sodium hydrate) in a suitable flask. The temperature is then raised to 70° C. and the solution thoroughly shaken for one hour. The addition of sodium sulphite is indispensable, owing to the fact that it forms a soluble sulphonic acid compound and a clear meniscus is thus obtained. The oil is then raised into the measuring burette and the diminution in volume gives the amount of total aldehydes. A correction must be made for the solubility of the terpenes in solution, by subtracting 0.35 cc. from the reading.

When carried out in this way, results are obtained varying within 0.2 percent. The authors consider the percentage of citral in lemon oil to be much nearer 4 percent than 7—8 percent as claimed by others.

The London Essence Co.,† in reply to Schimmel & Co.'s criticism of Burgess & Child's article, state that when citral is assayed "by direct methods on the oil itself," too high results are invariably obtained. They recommend that the oil be concentrated to $\frac{1}{20}$ of its volume and then steam distilled.

III. Normal Sodium Sulphite Method.

Tiemann‡ has shown that if citral be agitated with a neutral solution of sodium sulphite, a sodium salt of the sulphonic acid results, as shown by the following reaction:

$$C_9H_{15}CHO + 2Na_2SO_3 + 2H_2O = C_9H_{17}(NaSO_3)_2CHO + 2NaOH.$$

---

* Journ. Soc. Chem. Ind., 20, p. 1176.
† Chem. & Drugg., 60, p. 812.
‡ Berichte, 31, p. 3815.

Burgess & Child* by taking advantage of the sodium hydroxide formed in this reaction, have used phenolphthalein as an indicator to show when all the citral has been combined. They recommend the following method as both accurrate and simple in as much as the sodium salt is quite soluble:

"A saturated solution of sodium sulphite is prepared and, if acid, is neutralised with a solution of sodium hydrate until a faint pink color is permanently maintained with phenolphthalein. To 50 cc. of such a solution 25 cc. of the oil are added and two drops of an alcoholic solution of phenolphthalein. The whole is then heated on a water bath to nearly the boiling point, constantly shaking. A deep red color almost at once appears, which shows that the action has commenced. A few drops of sulphurous acid are then cautiously added and this is continued until no further color is produced. The volume of the residual oil is then measured as in the bisulphite method. The obvious advantage of this method is that the end of the reaction may be ascertained to a certainty.

By titrating the alkali formed in Tiemann's reaction with standard acid, Sadtler† has devised a volumetric method for assaying citral. His method is as follows:

5 to 10 grams of lemon oil are weighed in an Erlenmeyer flask and after neutralization, 25 or 50 cubic centimeters of a 20 p. c. sodium sulphite solution, depending upon the amount of oil used, are added. Before adding the sulphite solution, however, it is neutralized with a little N/2HCl, after being heated by immersion in a water bath, rosolic acid being used as indicator. When the oil and sulphite solution are mixed, a red color forms at once in the aqueous layer. This is discharged from time to time with N/2HCl, the flask being heated and agitated repeatedly. The reaction is complete in about half an hour, if kept hot, and the layers mixed frequently. When the color is all discharged, or all but a very faint pink which is not appreciably effected by a few drops more acid, the number of cc. of standard acid is noted. From the citral factor of N/2HCl, viz. 0.03802, the percentage of citral can readily be calculated.

When tried in this laboratory, this method gave the following results:

---

* Journ. Soc. Chem. Ind., 20, p. 1179.
† Advance Sheets of the Journ. of Franklin Institute, Oct. 15, 1903.

I. 5 P. C. SOLUTION OF CITRAL IN LIMONENE.

Wt. of oil used.	cc. of N/2HCl used.	Citral equivalent.	Percent.	Experimentor.
7.7335 gm.	10.6	0.403012	5.2	B.
4.1490 gm.	5.5	0.20911	5.04	“
4.4365 gm.	6.5	0.24713	5.5	“
4.5196 gm.	6.2	0.235724	5.2	“
7.5820 gm.	9.4	0.357388	4.7	R.
6.8350 gm.	8.8	0.334576	4.9	“
4.5460 gm.	6.1	0.231922	5.1	T.
4.4930 gm.	5.8	0.220516	5.09	“

II. OIL FROM FRITZSCHE BROS.

Wt. of oil used.	cc. of N/2HCl used.	Citral equivalent.	Percent.	Experimentor.
6.7387 gm.	7.5	0.285150	4.2	B.
6.6642 gm.	7.6	0.288952	4.3	“
5.4550 gm.	6.0	0.228120	4.18	R.
4.4300 gm.	4.7	0.178694	4.03	“
3.7960 gm.	4.3	0.163486	4.3	T.
5.1122 gm.	5.65	0.2148139	4.2	“

These figures show that even without experience fairly good results may be obtained by this method.

Method IV. With Phenyl Hydrazine.

In 1893 Benedict and Strache published their phenyl hydrazine method* for determining the aldehyde and ketone content of volatile oils. The oil is heated with phenylhydrazine, the hydrazone removed by filtration and the excess of the reagent determined as nitrogen, it having been decomposed with boiling Fehling's solution. Whereas several oils yielded results apparently satisfactory those obtained with lemon oil were less so. Two oils submitted by Schimmel & Co. yielded 3.7 and 4.7 percent respectively. These figures are rather low. Moreover, the first oil seems to have been a pure oil, whereas the second was suspected of being adulterated with turpentine oil, nevertheless the citral content of the second is given higher than that of the first.

No further experiments with this method seem to have been recorded. In order to ascertain something more definite about its value, it should be tried on mixtures of known citral content.

---

* Monatsh. f. Chem., 1893, p. 270; Ber. S. & Co., Oct. 1893, p. 48.

V. Reduction to Geraniol and Subsequent Acetylization.

In 1896 Garnett* based a method for the assay of citral on the reduction of citral to geraniol and the subsequent quantitative determination of geraniol by the usual acetylization method.

The reduction of citral to geraniol was carried out by Tiemann and Semmler† in 1893. They stated, however, that the reduction, by means of metallic sodium in alcoholic solution was anything but quantitative. The estimation of geraniol by means of the acetylization method was worked out by Schimmel & Co.‡ in the same year.

For the purpose of effecting the quantitative reduction of citral, Garnett§ employed its solution in glacial acetic acid and metallic sodium. The details of the process are, herewith, repeated verbatim:

About 20 or 30 ccm. (or less) of the oil are dissolved in rather more than an equal volume of glacial acetic acid, in a flask capable of holding 200 cc. and the sodium (about 5 grams) added gradually in small pieces, controlling the action so that the contents become quite hot, but so that the acid does not actually boil, adding a little more acid towards the end, if necessary. When all the sodium is dissolved, the cooled contents are diluted largely with water, transferred to a separator, and the separated oil well washed with water till free from more than traces of acid. The oil is then freed from water by allowing it to stand over night in contact with anhydrous sodium sulphate. The dried oil is then acetylated by Liebermann's method, viz. boiled with acetic anhydride and anhydrous sodium acetate to convert the geraniol into its acetic ester. Although a much smaller quantity would be theoretically required, I have usually employed from one-third to one-half its volume of acetic anhydride with about one-tenth part of anhydrous sodium acetate. The boiling is continued for two or two and a quarter hours, in a flask connected with a reflux condenser: after cooling, water is added, the whole heated on a water bath to decompose excess of acetic anhydride, further diluted, transferred to a separator, and the oil again washed with repeated quantities of warm water till quite neutral to litmus. The oil is then dried by contact with anhydrous sodium sulphate, and the whole or a portion of it taken for estimation of the acetic ester formed.

To a weighed quantity of the acetylated oil in a flask, excess of a normal or semi-normal alcoholic solution of potash is added, and saponified by boiling for half an hour under a reflux condenser; water (free from CO_2) is then added, and the excess of alkali titrated with a standard solution of acid. The difference gives the amount of alkali absorbed by the oil. From the figure obtained the percentage of citral in the original oil is calculated from the following formula:

---

* Chem. Drugg., 48, p. 599.
† Berichte, p. 2710.
‡ Ber. S. & Co., April 1893, p. 32.
§ Loc. cit.

$$\frac{N \quad 152 \quad 100}{W = (N \quad .044)}$$

Where N = number of cc. of normal alkali absorbed.

W = weight of acetylated oil taken.

152 is the molecular weight of citral, and .044 represents the increment in the weight of acetylated oil operated on, due to, the fact that citral (mol. wt. 152) has been increased by reduction and acetylization to geraniol acetate (mol. wt. 196)."

Artifical mixtures of citral (from oil of verbena, *Andropogon citratus*) and limonene (from lemon oil) of known proportion gave the following results:

1. A 7.46 p. c. solution gave 7.42 p. c. upon estimation.
2. A 6.3 p. c. solution gave 5.97 p. c. upon estimation.
3. A 7.59 p. c. solution gave 7.76 p. c. upon estimation.
4. A 6.66 p. c. solution gave 7.34 p. c. upon estimation.

The high result in the fourth experiment is attributed to insufficient washing of the acetylized oil.

Garnett recognized that the small amount of citronellal present might have some influence on the oil and promised to investigate this matter. He was relieved of this, however, by the chemists of Schimmel & Co. who made a somewhat exhaustive investigation of the subject.* They not only repeated Garnett's experiments with solutions of citral in limonene, with and without citronellal, but also studied the influence of most of the reagents employed on the three substances separately. The results obtained are shown in the following table:

		Acetylization.	Garnett's method.
Mixture I.	10 p. c. citral	6.83 p. c.	5.58 p. c.
" II.	5 p. c. citral and 5 p. c. citronellal	7.36 p. c.	7.55 p. c.
" III.	5 p. c. citral	2.96 p. c.	2.35 p. c.
" IV.	5 p. c. citronellal	4.89 p. c.	4.27 p. c.
Lemon oil		7.46 p. c.	5.90 p. c.

The conclusion drawn from a large number of experimental data is that the citronellal enters quantitatively into reaction upon acetylization,[*] the citral but partly.

---

* Ber. S. & Co., Oct. 1896, p. 32.

That the limonene or the products resulting from it also may enter into reaction has been shown by results not yet published. The figures obtained by Schimmel & Co.[†] also seem to show this although the results are differently interpreted by them.

In as much as Garnett does not seem to have published evidence supporting this method and contradicting the results of Schimmel & Co., the conclusion drawn by the latter, viz. that Garnett's method gives false results in spite of the fairly close approximation of his figures, seems fully justified. Umney[‡] had previously expressed his doubts concerning the method. He, however, gave no detailed analytical data to substantiate his conclusions. Umney once more called attention to the errors in Garnett's method in 1898.[§] Garnett replied to Umney's criticism.[¶] The method does not seem to have been proposed since.

VI. By means of Cyanacetic Acid.

Tiemann[‖] showed in 1898 that the condensation of citral with cyanacetic acid yields a crystalline citralidene cyanacetic acid $C_9H_{15}CH:C(CN)(COOH)$[**] melting at 122° and that this compound can be used for the approximate assay of citral.

From 200 cc. of lemon oil 175 cc. are distilled off at about 15 mm. pressure. The residue is measured and its temperature taken; 10 cc. of the residue are then shaken with a solution of 5 grams cyanacetic acid in 30 grams of a 15 percent soda solution in a small cassia flask, at a low temperature. The aldehyde portion of the oil dissolves in the alkaline aqueous solution whilst the lighter portions containing no aldehydes float on the top, and their volume can be read off from the graduated neck of the flask. This should be done at the same temperature as that previously obtained for the whole residue. The number of cc read off is then substracted from 10; the difference in proportion to the volume of lemon oil used (200 cc.) subsequently reduced to 100 cc. gives the percentage of aldehyde contained in the oil.

---

[*] According to Tiemann & Schmidt (Berichte 29, p. 913) citronellal is changed to isopulegol. This alcohol is then quantitatively acetylized as shown by the figures (99.5 p. c. and 99.86 p. c.) of Schimmel & Co. (S. & Co. Ber. Oct. 1896, p, 35).

[†] Ber. S. & Co., Oct. 1896. p. 34.

[‡] Chem. & Drugg., 48, p. 644.

[§] Pharm. Journ., 61, p. 196.

[¶] Chem. & Drugg., 48, p. 677.

[‖] Ber. 31, p. 3324.

[**] Ber. S. & Co., Oct. 1900, p. 22.

In order to test accuracy of this method several mixtures of known citral content were examined.

In a mixture of 6 p. c. by volume of citral and 94 p. c. of d-limonene, 6.2 and 6.35 p. c. of citral were found.

A mixture of 7 p. c. citral and 93 p. c. of d-limonene gave 7.14 to 7.3 p. c. of citral.

9 mixtures of 4.89 p. c. of citral, 1.2 p. c. of citronellal and 94 p. c. of d-limonene, which would be approximately equivalent to the relative proportion of the substances in oil of lemon, also assayed a little over 6 p. c.

Trials were then made with lemon oil but it was found nearly impossible to read the scale because of the shiny wax-like particles, originating from the peel, always present in the oil, which are deposited as a thick layer in the lower part of the neck of the flask.

Early in 1900 Parry* applied this reaction to the assay of lemon oil. His directions and comment are herewith quoted:

> "Two hundred cubic centimeters of the oil are concentrated to 25 cc. in a Wurtz flask under a pressure which should not exceed 15 mm. The 175 cc. of terpenes obtained contain a little citral but the quantity is so small that it may be neglected. Ten cubic centimeters of the residue, of which the specific gravity is ascertained are shaken with five grams of cyanacetic acid and 5 grams of ordinary caustic soda in 30 cc. of water in a small absorbtion flask with a long graduated neck and the non-absorbed residue read off as usual. The specific gravity of citral is so near that of the concentrated oil used that they may be taken as identical."

In duplicate experiments with the same oils, the following results were obtained:

Specific gravity of oil, 0.860.

Specific gravity of concentrated 25 cc., 0.898.

10 cc. (= 80 cc. original oil) gave α4.35, β4.30 absorbed.
α5.65, β5.70 unabsorbed.

"Taking the specific gravity of citral as 0.897, the results become 5.67 p. c. and 5.61 p. c. respectively. This is, of course, a selected example, where the concordance is almost complete, but I find that, with careful manipulation, results can be obtained which vary within 0.2 p. c.; and as Professor Tiemann, after extremely laborious research, came to the conclusion that the combination of citral with cyanacetic acid was absolutely complete, there seems no reason why this process should not be adopted for lemon oil, and the method quoted on the certificate. The only objection is that cyanacetic acid is a somewhat expensive reagent."

---

* Chem. & Drugg., 56, p. 876.

This method was tested by the chemists of Schimmel & Co.* who for solutions of citral in limonene obtained the following results:

For a 6 p. c. solution 6.2 to 6.35 p. c.

For a 7 p. c. solution 7.14 to 7.30 p. c.

For a 4.8 p. c. citral and 1.2 p. c. citronellal solution 6 p. c.

These results are slightly too high although a part of the aldehyde passes over during the distillation and thus is lost for the assay. The hydrocarbon distillate when tested showed from 0.7 to 1.0 p. c. aldehyde. The high result must, therefore, be ascribed to the fact that some of the limonene goes into solution with the citralidene and citronellal acetic acids.

Parry,† in 1900, says that S. & Co.'s criticisms do not hold, and he claims to obtain very accurate results with this method.

Burgess & Child,‡ in 1901, tried this method, and in their opinion the method is practically useless, as it is impossible to read the meniscus owing to resinous and slimy matter.

VII. By means of Hydroxylamine.

Schimmel & Co. § tried to make use of citraloxime for the citral assay of lemon oil. The oil was treated with an excess of hydroxylamine, and the nitrogen of the washed oil estimated by means of the Kjeldahl method. The method proved rather complex and the results were not sufficiently accurate.

In 1899 Walther¶ tried a different modification of the oxime method.

An alcoholic solution of hydroxylamine hydrochloride of known strength is heated with a definite amount (about 10 grams) of lemon oil and some sodium bicarbonate for about ¾ hour on a waterbath in a flask connected with a reflux condenser. Upon cooling the product of reaction is titrated with N/10 Soda V. S. for the excess of hydroxylamine hydrochloride. The difference between the hydroxylamine hydrochloride used and found is the amount of the reagent that reacted with the citral.

---

* Ber. S. & Co., April 1900, p. 22.

† Chem. & Drugg., 57, p. 1000.

‡ Journ. Soc. Chem. Ind., 20, p. 1178.

§ Ber. S. & Co., April 1900, p. 20.

¶ Pharm Centralh., 40, p. 621; Ber. S. & Co., April 1900, p 28.

The chemists of Schimmel & Co.,* however, when they tried this method with a 5 p. c. solution of citral in dipentene obtained 6.04, 5.70 and 6.18 p. c. respectively. The cause for this difference seems to be in the action of the sodium bicarbonate on the hydroxylamine hydrochloride as was shown in a series of experiments. On account of this action the process must be pronounced impracticable.

In reply to S. & Co. criticisms, Walther,† in 1900, stated that the sodium bicarbonate has no appreciable effect on the hydroxylamine solution and proved it by a series of control tests on hydroxylamine hydrochloride. Upon assaying a number of samples of lemon oil, he obtained results which agree within 0.2 of a percent. Burgess and Child,‡ in 1901, tried this method and found it to give very good results with lemon oil.

VIII. By means of Citryl-β-Naphthocinchoninic Acid.

In 1894 Doebner§ showed that citral combined with pyroracemic acid and β-naphthylamine to form a compound which he designated citryl-β-naphthocinchoninic acid.

In 1898 he made use of this compound to ascertain the amount of citral in lemongrass oil, finding 82 p. c. He proceeded as follows:¶

40 grams of lemongrass oil were digested in alcoholic solution with 40 grams of naphthylamine and 24 grams of pyroracemic acid by means of a reflux condenser. 32 grams of pure citryl-β-naphthocinchoninic acid resulted corresponding to 82 p. c. of citral.

In 1898 Tiemann found‖ that Doebner's reaction yields good quantitative results only when citral is in excess. If the pyroracemic acid is used in excess, side reactions result with the formation of methyl-β-naphthocinchoninic acid. These facts, therefore, seem to exclude the application of this method for assay purposes.

---

* Ber. S. & Co., April 1900, p. 20.
† Pharm. Centralh., 41, p. 585.
‡ Journ. Soc. Chem. Ind., 20, p. 1178.
§ Berichte, 31, p. 1891.
¶ Berichte, 31, p. 1888.
‖ Berichte, 31, p. 3324.

You Can Do What He Did

THIOCOL ROCHE is a water-soluble, easily taken, effective form of guaiacol. It is likely to be in special demand during the colder months, as it is used in tuberculosis, pneumonia, chronic bronchitis, etc. It is marketed in four forms: Powder; 5-grn. Tablets; Sirolin (Syr. Thiocol Roche), 6 grn. to teaspoonful; and Syr. Thiocol Comp.

Last January a druggist of Cumberland, Maryland, wrote to us asking for 20 copies of Merck's Digest on Thiocol. His object was to distribute this printed matter among his local physicians. Recently he wrote for other literature, making this incidental statement: "With the literature on Thiocol that you sent me last winter, I succeeded in getting a very profitable demand for the article."

You Can Do What He Did

MERCK & CO.

UNIVERSITY PLACE,
NEW YORK.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 473 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street **111 Fifth Avenue**
PHILADELPHIA **NEW YORK**

— Die —

Deutsche Botanische Monatsschrift

beginnt demnächst ihren XX. Jahrgang. Sie kostet jährlich 6 Mark und sei allen Botanikern und Freunden der heimischen Flora bestens empfohlen.

Arnstadt, Thüringen.
Prof. Dr. G. Leimbach.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY

OF THE

UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

Best eingeführter

...Kaufmann...

im Deutschen Reiche. sucht Vertretung in der ***Apotheker- und Drogenbranche.***

Gefl. Offerten unter 508 postlagernd, ***Bromberg.***

Verlag von Herman Heyfelder — Berlin.

Chemisch-technisches Repertorium.

Uebersichtlicher Bericht über die **neuesten Erfindungen, Fortschritte u. Verbesserungen auf dem Gebiete der technischen und industriellen Chemie.**

Herausgegeben von **Dr. Emil Jacobsen.**

— 35. Jahrgang. —

Mit in den Text gedruckten Illustrationen. 1896

NEW EDITION

Webster's International Dictionary

25,000 NEW WORDS, ETC.

Prepared under the direct supervision of W. T. HARRIS, Ph.D., LL.D., United States Commissioner of Education, assisted by a large corps of competent specialists and editors.

New Plates Throughout. Rich Bindings.
2364 Pages. 5000 Illustrations.

Better Than Ever for Home, School, and Office.

Also **Webster's Collegiate Dictionary.**

Specimen pages, etc., of both books sent on application.

WEBSTER'S INTERNATIONAL DICTIONARY

G. & C. Merriam Co., Springfield, Mass.

Chicago College of Pharmacy.

THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF ILLINOIS.

The forty-fourth session begins September 29th, 1903. The course comprises two terms of seven months each and leads to the degree of Graduate in Pharmacy. Write for the announcement to . . .

W. B. DAY, ACTUARY,
465 STATE ST., CHICAGO.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

ples and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

SOME OF THE NEW BOOKS.

We present below a selection from the Fall books published or announced, including only those that promise to be the most important or the best sellers.

GIFT BOOKS.

Bar Sinister, The. By Richard Harding Davis. New illustrated edition. With 8 full-page drawings in color by E. M. Ashe. $1.50.

A pretty story of a dog, said to be drawn from life. Attracted attention when published in Scribner's, and sold well in ordinary book form.

Checked Love Affair, A. By Paul Leicescter Ford. Illustrated in color, with numerous pictures in photogravure, and decorated. $2.00.

A new story and probably the last by this author that will see the light.

Colonel Carter's Christmas. By F. Hopkinson Smith. With 8 full-page pictures in color by F. C. Yohn. $1.50

A new story about a favorite character in modern fiction.

Heart of Hyacinth, The. By Onoto Watanna. With marginal drawings in tint by a Japanese artist. Illustrated in color. Net $2.00.

A very attractive gift-book.

In Arcady. By Hamilton Wright Mabie. With 4 full-page illustrations by Will H. Low, and numerous decorations in color by Charles L. Hinton. .... Net $1.80

Mrs. Wiggs of the Cabbage Patch. By Alice Hegan Rice. Illustrated edition. With 24 illustrations, 12 in black and white, and 12 reproduced in color, by Florence Scovel Shinn. $2.00.

The ordinary edition (at $1.00) is still selling well, and there is no doubt that this style will be very popular for the holidays.

Weaker Sex, The. By Charles Dana Gibson. Net $4.20.

A new Gibson book is one of the events of the year, and always popular.

FICTION.

Adventures of Gerard, The. By A Canon Doyle. Illustrated. $1.50.

Gerard is an old friend, and his adventures are very entertaining.

Barlasch of the Guard. By Henry Seton Merriman. Illustrated by the Kinneys. $1.50.

Mr. Merriman is continuously popular, and his books always find a ready sale.

Castle of Twilight, The. By Margaret Horton Potter. Ilustrated in tint by Ch. Weber. $1.50.

A serious and thoroughly interesting study of woman's life in feudal days. The fifth book of this remarkable young writer.

Cherry. By Booth Tarkington. Ilustrated in color by A. I. Keller. With decorations. $1.25.

A charming story of old New York, in the bright style of "The Two Vanrevels."

Forest Hearth, The. By Charles Major. $1.50.

A story of Indiana in the 'thirties, by the writer who won so great a success with "When Knighthood was in Flower.

Fortunes of Fifi, The. By Molly Elliot Seawell. Illustrated in colors by T. de Thulstrup. $1.50.

A merry little comedy of the time of Napoleon, who plays a pleasant part therein.

Heart of Rome, The. By F. Marion Crawford. $1.50.

This promises to be one of the best of this favorite author's novels—dealing with the city he loves and knows so well.

Jewel. A Chapter in Her Life. By Clara Louise Burnham. Illustrated. $1.50.

A story by a popular writer showing the good accomplished by Christian Science, even through the medium of a child.

John Burt. By Frederick Upham Adams. Illus. $1.50.

A story that has attracted a great deal of attention while running as a serial.

Little Shepherd of Kingdom Come, The. By John Fox, Jr. Illustrated by F. C. Yohn. $1.50.

Probably destined to be the leading novel of the Fall. Like all of this writer's it is a Kentucky story and the most important he has yet written.

Long Night, The. By Stanley J. Weyman. Illustrated. $1.50.

A story of Geneva in the late Middle Ages, by a writer whose stories of adventures long ago have always sold well since the publication of "A Gentleman of France."

Mettle of the Pasture, The. By James Lane Allen. .... $1.50.

A story involving a question of conscience. The book has aroused a great deal of attention and discussion.

Over The Border. By Robert Barr. $1.50.

Mr. Barr has chosen the time of Cromwell for his new book, and it is safe to say that it will be interesting.

Rebecca, of Sunnybrook Farm. By Kate Douglas Wiggin. $1.25.

One of Mrs. Wiggin's entertaining stories, full of a delightful humor, and a fresh feeling for life and nature.

Sanctuary. By Edith Wharton. Illustrated by Walter Appleton Clark.. $1.50.

A strong and vivid story, treating of a psychological situation arising from a question of heredity.

Vagabond, The. By Frederick Palmer. Illustrated by Harrison Fisher. $1.50.

An interesting story of which the latter and longer part is concerned with the Civil War. It is well told and full of incident.

BIOGRAPHY AND HISTORY.

Cambridge Modern History. Planned by the late Lord Acton. Per vol., Net $4.00.

II. The Reformation. VII. The United States.

This is one of the most important historical works for several years. The volume on the United States, by both English and American writers, has proved of the greatest value.

Gladstone, The Life Of. By Rt. Hon. John Morley. Illustrated with portraits, facsimiles, and other pictures. 3 vols. Net $10.50.

The most notable book of the Fall, long announced and eagerly awaited. It is history as well as biography, by the best authority.

Old Quebec: The Fortress of New France. By Sir Gilbert Parker. With over 100 illustr. Net $3.50.

The author is a Canadian, and tells the story of the historical and romantic old town with the truth of history and the charm of fiction.

MISCELLANEOUS.

Five Nations, The. By Rudyard Kipling. Net $1.40.

The first colection of Mr. Kipling's poems since 1896. There are about twenty-five new poems, besides the most famous recent ones.

Forest, The. By Steward Edward White. Illustrated by Thomas Fogarty. Net $1.75.

No reader of "The Blazed Trail" needs to be told that Mr. White can write an intensely interesting book on forests and forest-life.

Glimpses of Truth. By Bishop J. L. Spalding. With new photogravure portrait. Net $0.80. Half calf or half morocco, gilt top. Net $2.00.

Some of Bishop Spalding's helpful philosophy in the form of aphorisms.

JUVENILE..

Crimson Fairy Book, The. By Andrew Lang. Illustrated in color and in black and white. Net $1.60.

Henty Books. Two new ones: Through Three Campaigns; With the Allies to Pekin. Illustrated. Per vol., Net $1.20.

Orchardland. By Robert W. Chambers. With 7 full-page illustrations in color and many marginal drawings by Reginald B. Birch. Net $1.50.

A companion to "Outdoorland," published last year.

Star Fairies, The, And Other Tales. By Edith Ogden Harison. Illustrated in color by Lucy Fitch Perkins. Net $1.25.

A charming successor to "Prince Silverwings," by the wife of the mayor of Chicago.

Two Little Savages. By Ernest Thompson Seton. Profusely illustrated by the author. Net $1.75.

A book of woodcraft for boys, by the author of "Wild Animals I Have Known."

All books postage free, except those marked "Net," for which add 10 per cent for postage.
Discount allowed on all books not marked net.

We carry the most complete stock of

ENGLISH AND GERMAN BOOKS.

Scientific and technical Works, Periodicals & Newspapers
are furnished on short notice, or if not in stock will be procured without delay at moderate prices.

The Geo. Brumder Book-Department, Milwaukee, Wis.

Money in

Perfume Essences

Only dilution with cologne spirits is required to produce all the "swell" odors of triple and quadruple extracts from our

ABSOLUTE ESSENCES

They represent highly concentrated compositions of perfume bases and each odor is complete in itself.

Price list and descriptive literature on demand.

Manufacturing
Perfumers

LEHN & FINK New York

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

CARBOLIC ACID.

We remind druggists that our Acid is sold under the "Gilt Label" brand which has been well and favorably known to druggist and physicians for many years. Our Acid has a high melting point, 40° C., which is above the requirements of the Pharmacopoeia and of the brands usually sold. When ordering Carbolic Acid, ask your jobber to send you the "M. C. W." brand which costs no more than any other.

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,

ST. LOUIS **NEW YORK**

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.
Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 3. **MARCH, 1904.**

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial.. 81
The international atomic weights. By *A. B. Lyons*.. 86
A simple quantitative determination of formaldehyde and paraformaldehyde. By *Clemens Kleber*.. 84
The proposed volatile oils of the U. S. P. 1900. By *E. Kremers*.. 96
The sesquiterpenes. A monograph by *Oswald Schreiner*.. 101
Books reviewed.. 116

Adnephrin Pays You

Every druggist should carry Adnephrin Solution in stock.
Its superiority over other adrenal preparations is undoubted.
Physiologic tests demonstrate its greater activity.
Daily use shows its greater permanence.
Oculists find it non-irritating.
In short it is the most satisfactory preparation of the kind ever offered.
And the price to the druggist is just

**60 cents
an ounce.**

Physicians will appreciate—do appreciate—the opportunity of getting **a better** article at a more reasonable price.
You cannot afford to miss Adnephrin Solution. It should **always** be in stock. Liberally advertised to the medical profession, it is already having a large sale.
And every ounce of it is sold by retail druggists!
Order through your jobber, or direct.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.
STEARNS QUALITY
WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H WIRZ,
913-917 Cherry St.,
PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

ANUSOL SUPPOSITORIES
CURE HEMORRHOIDS RELIEVE CONSTIPATION
COMFORTING AND CURATIVE – SWIFT, SURE AND SAFE
THE BEST OF ALL REMEDIES
BECAUSE THE MOST EFFECTIVE
THAT'S THE REASON THEY SELL SO WELL
YOU WILL NEVER REGRET KEEPING THEM IN STOCK
A PROFIT BRINGING REMEDY OF RENOWN
OF ANY WHOLESALER
SCHERING & GLATZ 58 MAIDEN LANE, NEW YORK
SOLE AGENTS FOR U. S. AND CANADA.

PASTEUR SERUMS are made under the personal supervision of ROUX
ROUX – the greatest living authority on
DIPHTHERIA
ROUX – the father of
ANTITOXIN
ONE STRENGTH – LIQUID OR DRY
THE DRY FORM KEEPS INDEFINITELY
SHARP & DOHME
SOLE DEPOSITARIES U.S.A.

ACETONESULPHITE

RESTRAINER
Saves Over-Exposures
of any Degree.

SUBSTITUTE
for the
Sulphites.

PRESERVATIVE
Keeps Fixing Baths
Clear and Stable for Weeks.

EDINOL

Best All-Around Developer
for Plates, Paper, etc.
Never Fogs or Stains.

FLASHLIGHT

Practically no Smoke or Dust.
Safe. Efficient.
Strongest Actinity.

INTENSIFIER

Works in one Solution,
Which can be used Repeatedly;
Keeps Indefinitely.

FIXING SALT

A Rapid Working Acid Fixing Bath;
Clear and Effective
After Weeks of Use.

Selling Agents for the United States and Canada
FARBENFABRIKEN OF ELBERFELD CO., 40 Stone St., New York.

Trade also Supplied by

EDWARD H. BUEHLER,
134 Lake St., Chicago, Ill.

DOMINION DYEWOOD & CHEMICAL CO.,
Toronto, Ont., Canada.

OCCIDENTAL SUPPLY CO.,
131 Second St.,
San Francisco, Cal.

For Sale by All Dealers in Photographic Supplies and Wholesale Druggists.

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.

(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach. Pleasant in taste and readily assimilated.

★ ★ ★

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

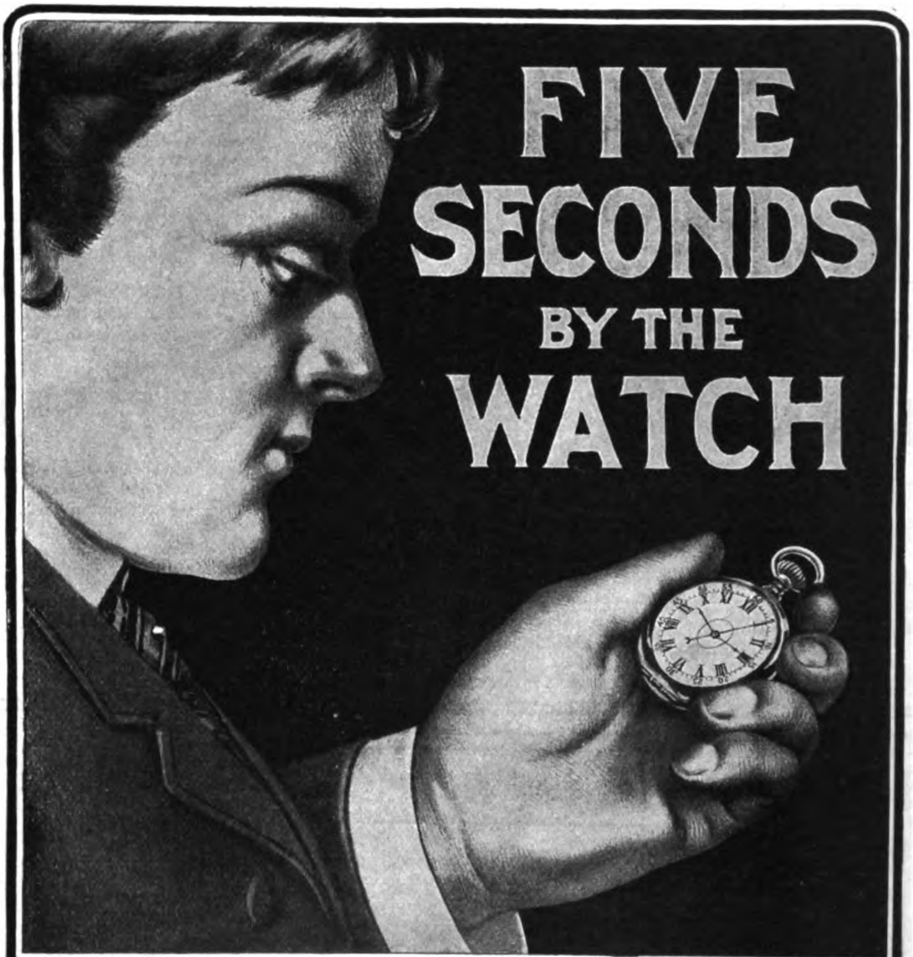
DOSE FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

★ ★ ★

KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**



The life of a patient often depends upon the promptness with which a hypodermatic injection is given.

Quick and complete solubility in a hypodermatic tablet is therefore of the utmost importance.

And by "solubility" we mean not merely disintegration.

Many hypodermatic tablets go quickly enough to pieces when thrown into water, their undissolved particles settling to the bottom and solution proceeding slowly if at all.

With an open watch before you, drop one of our Hypodermatic Tablets into a syringe half filled with luke-warm water; shake vigorously; in five seconds (or less) it will have dissolved completely.

Why not always specify "Parke, Davis & Co." and get the best?

PARKE, DAVIS & COMPANY

LABORATORIES: Detroit, Mich., U.S.A.; Walkerville, Ont.; Hounslow, Eng.
BRANCHES: New York, Chicago, St. Louis, Boston, Baltimore, New Orleans, Kansas City, Indianapolis, Minneapolis, Memphis; London, Eng.; Montreal, Que.; Sydney, N.S.W.; St. Petersburg, Russia; Simla, India; Tokio, Japan.

Pharmaceutical Review.

VOLUME 22. **MARCH, 1904.** NUMBER 3.

Editorial.

In reply to a circular letter addressed to a number of officers of the American Pharmaceutical Association, the writer has received several communications relative to the **finances of the A. Ph. A.** which will, no doubt, be of interest to the members of this association in as much as they reflect the attitudes of persons looking at the same subject from different points of view.

The following letter was received from the President of the Association, Mr. Lewis C. Hopp:

> Your letter with editorial on A. Ph. A. finances received. I am afraid that its publication will be most unfortunate in that it will create the impression that the Association is not well financed. This may be true in a sense, but for a non-profit sharing organization, I think the showing is not so bad. A deficit for 17 years of an average of only $158.90 yearly, and not $176.49 as your editorial has it.* (Deficit column foots up $8036.83 instead of $8236.83). Rather a good showing when one considers the method by which our expenses are made. I was much in hope that the question of finances would not appear in the press until after our next meeting. I know one or more plans will be presented at our next meeting, which I think will bring about a change in the methods of doing business, which will keep the expenses within our income. I hope the publication of this editorial will not prevent us in securing a large number of new members. With an addition to our membership of 300, with financial methods changed, I think we will find the Association having a surplus account each year instead of the showing of a seeming deficit.

Our President appears to be the only one who fears unfortunate results from the public discussion of our association finances. We are pleased to learn that plans are to be presented at the Kansas City meeting for the improvement of the finances of the A. Ph. A. Plans have been presented on previous occasions, but the Assn. has not been taken into the confidence of the men who proposed them.

---

* Mr. Hopp's statement is based on the uncorracted galley proof sent him directly from the printer.—*Ed.*

What we need, first of all, is a better understanding of our finances on the part of the large body of members who vote the expenses.

No reader of last month's editorial will find in it a note of alarm. A calm, business-like discussion of association finances will not frighten away prospective members. Whatever view we may take of certain phases of the situation, the financial situation of an association that has a fair reserve fund is not likely to frighten away participants in the benefit of such a reserve.

For a number of years, Mr. Charles E. Dohme has been Chairman of the Finance Committee of the A. Ph. A. His view of the situation, therefore, ought to be of special interest.

Whilst naturally interested in all questions connected with the American Pharmaceutical Association, and particularly questions of finance, having been Chairman of the Finance Committee for many years until quite recently, that I would gladly have elaborated my views on this important question if my time had permitted.

I can now only briefly say, that I think the financial condition of the Association has, in all these years, been in such an excellent and unembarassing condition, that I did not think it necessary to dwell on any details revealed by the excellent statement given you by our Treasurer, S. A. D. Sheppard, which covers the whole question, and can easily be overlooked, and with which naturally I was quite familiar under the circumstances of my being connected with the Finance Committee.

I can see no possible reason that we should worry about anything connected therewith, and that no economizing measures need be resorted to to better it.

It is not necessary, that we should accumulate much of a surplus, and the very small deficits that have developed in the several years of our existence are not at all alarming. and can easily be met by funds we have, and which funds are only of use to assist and help us out, when any extraordinary or rather unusual expenditures have to be met by the Association.

I really do not think it advisable to draw the attention of the members generally to such small items, and alarm such as are timid and fearful of a financial difficulty, and which cannot occur whilst our Association is so well and carefully financed and officered.

Moneys that are spent by the Association are absolutely necessary to run it efficiently, and cannot well be curtailed without damaging its usefullness, and any extraordinary expenditure is only ventured upon after having been fully investigated and recommended by the Council, which is always acquainted with the financial condition, and which has always economically overlooked all such items of expenditures.

I am very sorry that want of leisure does not permit me to go into more details, but trust that this statement on my part, being one familiar with the custom and necessary expenditures of the Association will be sufficient to re-assure such as may feel somewhat alarmed regarding any danger of a financial trouble that might overtake the Association.

I do not know whether you intend to give publicity to these remarks of mine, which have been hurriedly written, or not, but I wish to be thoroughly understood, that I see nothing in the statement as rendered by the Treasurer to require any measures or legislation on part of the Association to reduce its expenditures or increase its income.

The A. Ph. A. will always remain indebted to those of its unsalaried officers who, year after year, have given the affairs of the association their time and service. The writer is not aware of any spirit of faultfinding among the rank and file of the association members with their officers. It does not follow, however, that we must all be of the same opinion. There are officers as well as others who have regretted the withdrawal of a single dollar from our reserves. If we had been able to add several thousand dollars to our reserves instead of withdrawing them we might be so much nearer the realization of a permanent fund, be it for general research or for a memorial laboratory at Washington in which some of the important pharmacopœial problems might be investigated by experts.

The following communication from the Chairman of the Council, Professor J. H. Beal, is of value, because we all know that he is not likely to take alarm, or to pass snap judgment on any question pertaining to the wellfare of the A. Ph. A.

Treasurer Sheppard has certainly presented us with an interesting and highly instructive statement of the financial history of the American Pharmaceutical Association for the past seventeen years, and one for which the members of the Association should be profoundly grateful. Associations no less than individuals when they habitually spend more than their income eventually arrive at a period of bankruptcy. To prevent such a consummation, the A. Ph. A. must either devise a means of increasing its yearly receipts or else cut down its yearly expenditures. If the first is not possible, then the second is absolutely necessary. It is true that the Association spends no money needlessly and that all of the interests which it takes care of are proper ones, nevertheless, when confronted by such a condition as the present there is no alternative but to make a reduction of expenses somewhere. This reduction might be made by cutting off some appropriations so as to keep the total expense for the year within the limit of receipts for the same period. The latter would perhaps be the better plan, since a division of the cut all along the line would not be severely felt by any one of the interests affected.

I believe that the Council should be given authority to scale down the appropriations made by the general sessions to such a point as will keep expenses within receipts, and until I know of a better remedy, I shall favor this plan.

The present condition of the Association, while not sufficiently serious to excite alarm, is sufficiently so to show the necessity of careful action by those who have its financial affairs in charge.

The Secretary of the Council, Professor H. M. Whelpley, writes that he is too busy at present to give sufficient study to the subject, but promises to do so in the future. He adds: "Am glad to see you taking it up in the manner in which you have." From Treasurer Sheppard several communications were received to which reference will be made below.

In the tabulated account of the Treasurer referred to last month, Mr. Sheppard gives "Sundry memoranda outside the regular receipts and regular expenses, therefore not included in the foregoing schedules; thus allowing a more just and fair comparison of one year with another." Such a separation of these accounts by the Treasurer seemed sufficient justification on part of the winter not to include them in the totals presented last month. If further justification be necessary, it may be found in the following communication of the Treasurer, since received.

Pondering over your editorial, the following thoughts have come to me. If I had put the receipts from the National Formulary in the schedule of receipts, and the payments on account of National Formulary in the schedule of expenses, the figures in your table would necessarily have been different, and, in fact, the whole tone of your editorial would necessarily have been different. Many members of the Association would have put the Formulary figures among receipt and expenses.

I put them outside, among "Sundry Memoranda," and I think rightly so, for the following reasons: I think that the financial policy of the Association should be so formulated, that the question of income from the Formulary should not be an item of importance. To state the question in another way, my judgment always has been, and now is, that the Association should publish the Formulary as a help to the physicians and pharmacists of the U. S. irrespective of the question whether it is a source of income or otherwise.

It is good business policy to make it pay expenses if possible, and if by selling the book at a low price, the Association makes a profit, there is no harm in it, but I think the profit on it should be set aside every few years, for some good and special purpose. It should be considered as an *outside* matter.

If your editorial is printed as it now stands, this question must come up in the public discussion, and I state my position to you now, in order that you may understand clearly that I put the Formulary figures outside intentionally, and with definite purpose.

For the benefit of those who have not seen the "Schedules" of the Treasurer, the following tabulation of the National Formulary account may, herewith, be reproduced. The receipts are those obtained from the sale of the Formulary, the expenses those necessitated by the preparation of the book.

Year.	Receipts.	Expenses.
1886	——	$ 33.25
7	——	510.59
8	$ 4178.02	3357.97
9	1224.98	366.09
1890	990.43	334.06
1	836.44	292.00
2	548.07	264.38
3	289.54	143.35
4	324.28	139.65
5	752.12	972.63
6	936.11	187.99
7	598.74	91.26
8	503.78	211.12
9	431.89	482.66
1900	539.74	315.50
1	378.32	129.47
2	362.34	151.65
	$12,894.80	$7983.62

This account, therefore, shows a credit balance of $4911.18, a fact that is very gratifying indeed. It is only to be regretted that the money, thus obtained, had to be utilized for current expenses. If the money thus made had been set apart annually and if the interest had been allowed to accumulate we might hope to see the revision of this useful formulary placed on an excellent financial basis.

The International Atomic Weights.

By *A. B. Lyons.*

The International Committee on Atomic Weights has made its annual report, confirming the constants adopted for 1903 except in the cases of Caesium and Cerium. The atomic weight of the former has been lowered by 0.1 to agree with the results reached by Richards and Archibald, while that of the latter has been increased by about 0.2 in view of the experiments of Brauner.

An examination of the Table of International Atomic Weights reveals inconsistencies between the two sets of figures based respectively on $O=16$ and $H=1$. The ratio ought to be uniformly 16.00:15.88. Of course the exact maintanence of that ratio is inconsistent with the plan that has been adopted of limiting the number of decimal places so that the figures may not have an exactness not warranted by actual knowledge.

It is noticeable in the table that many of the atomic weights based on $O=16$ are integral numbers. This is true of no less than thirty of the seventy-eight enumerated. In only fourteen of these is the determination, however, represented as exact to the first decimal place. In the case of Carbon, a second decimal is added, indicating that this determination has been made with a higher degree of exactness. There remains in the mind of an outsider an uncertainty whether or not in the other sixteen cases the figures corresponding with $H=1$ indicate more exactly than those corresponding with $O=16$ the results of actual determinations. One thing is evident, viz. that if the table is intended for practical use, one set of figures must be definitely adopted as authoritative, and the other set must be made to correspond mathematically with these, so that, whichever set of figures is used the results of analyses based on them must correspond. If this principle is carried out, the result will be that the figures which are secondary will have the appearance of greater exactness than those of the primary column. In the latter the decimals will be carried to two places only when the results of experimental determinations warrant it, but the corresponding figures in the former column will be carried out uniformly to two decimal places.

It seems fair to assume that the column based on O=16 is to be considered authoritative. On this assumption, I have calculated the values of the atomic weights on the basis of H=1, carrying out decimals to the second place. The results are as follows:

	O=16	H=1 Calculated.	H=1 International.
Aluminium	27.1	26.90	26.9
Antimony	120.2	119.30	119.3
Argon	39.9	39.60	39.6
Arsenic	75.0	74.44	74.4
Barium	137.4	136.37	136.4
Bismuth	208.5	206.94	206.9
Boron	11.	10.92	10.9
Bromine	79.96	79.36	79.36
Cadmium	112.4	111.56	111.6
Caesium	132.9	131.90	131.9
Calcium	40.1	39.80	39.8
Carbon	12.00	11.91	11.91
Cerium	140.25	139.20	139.2
Chlorine	35.45	35.18	35.18
Chormium	52.1	51.72	51.7
Cobalt	59.0	58.56	58.56
Columbium	94.	93.30	93.3
Copper	63.6	63.12	63.1
Erbium	166.	164.75	164.8
Fluorine	19.	18.86	18.9
Gadolinium	156.	154.83	155.
Gallium	70.	69.47	69.5
Germanium	72.5	71.96	71.9
Glucinum	9.1	9.03	9.03
Gold	197.2	195.72	195.7
Helium	4.	3.97	4.
Hydrogen	1.008	1.000	1.000
Indium	114.	113.14	113.1
Iodine	126.85	125.90	125.90
Iridium	193.0	191.54	191.5
Iron	55.9	55.48	55.5
Krypton	81.8	81.19	81.2
Lanthanum	138.9	137.86	137.9

Lead	206.9	205.35	205.35
Lithium	7.03	6.98	6.98
Magnesium	24.36	24.20	24.18
Manganese	55.0	54.59	54.6
Mercury	200.0	198.50	198.5
Molyldenum	96.0	95.28	95.3
Neodymium	143.6	142.52	142.5
Neon	20.	19.85	19.9
Nickel	58.7	58.26	58.3
Nitrogen	14.04	13.94	13.93
Osmium	191.	189.57	189.6
Oxygen	16.00	15.88	15.88
Palladium	106.5	105.70	105.7
Phosphorus	31.0	30.77	30.77
Platinum	194.8	193.34	193.3
Potassium	39.15	38.86	38.86
Praseodymium	140.5	139.44	139.4
Radium	225.	223.31	223.3
Rhodium	103.0	102.23	102.2
Rubidium	85.4	84.76	84.8
Ruthenium	101.7	100.94	100.9
Samarium	150.	148.88	148.9
Scandium	44.1	43.77	43.8
Selenium	79.2	78.61	78.6
Silicon	28.4	28.19	28.2
Silver	107.93	107.12	107.12
Sodium	23.05	22.88	22.88
Strontium	87.6	86.94	86.94
Sulphur	32.06	31.82	31.83
Tantalum	183.	181.63	181.6
Tellurium	127.6	126.64	126.6
Terbium	160.	158.80	158.8
Thallium	204.1	202.57	202.6
Thorium	232.5	230.76	230.8
Thulium	171.	169.72	169.7
Tin	119.0	118.11	118.1
Titanium	48.1	47.74	47.7
Tungsten	184.	182.62	182.6
Uranium	238.5	236.71	236.7

Vanadium	51.2	50.82	50.8
Xenon	128.	127.04	127.
Ytterbium	173.0	171.70	171.7
Yttrium	89.0	88.33	88.3
Zinc	65.4	64.91	64.9
Zirconium	90.6	89.92	89.9

Comparing the figures of the third with those of the second column in this table, we observe that except in five instances the differences, when they exist, are due to the fact that in the International table the decimals are not carried beyond the first place. The figures in question are those for Gadolinium, Germanium, Magnesium, Nitrogen and Sulphur. The discrepancy in the case of Gadolinium is to be explained on the ground that this constant has not been determined with sufficient exactness to give greater probability to either of the integral figures given. Since, however, integral values have been assumed for a large number of elements on the basis $0 = 16$, it would seem rational to carry out the hypothesis in this case also. The discrepancy in the case of Nitrogen is rather apparent than real, since the calculated figure is 13.935, that of the International table being 13.93. The discrepancies in the cases of Magnesium and Sulphur are inexplicable and, it seems to me inexcusable. Decimals are here carried in each case to the second place, and correspondence ought to be exact.

Unexpected agreement is found in the International table in the figures for Cobalt, Glucinum, Phosphorus and Strontium, where we find the decimals in the second column carried to the second place, those in the first column being in two instances integers and in the others carried only to the first decimal. No reason appears why the figures should be treated in this exceptional way in these cases. They seem to show, however, that the figures of the first column are regarded by the Committee as the primary ones.

The remaining discrepancies, as I have said, arise from the principle that has been generally adhered to of carrying out decimals in the second column only to the first place, unless they are carried to the second place in the first column. Such an arbitrary rule, however, sacrifices the spirit to the letter of the law. A mathematician would see something in these relations more important than the decimal point. He would see at once that 0.01 is as large a fraction of 10. as 0.1 is of 100. While, therefore, he would regard a second decimal figure as uncalled for when an atomic weight was as high as that of Barium or Bismuth, he would consider it quite essential in such a case as that of Boron, Lithium or Helium. If he made an arbitrary rule it would be that the number of significant figures in the secondary column should never be less than four. The rule would have important application in the cases of Arsenic, Boron, Chromium, Copper, Fluorine, Iron, Manganese, Nickel, Silicon, Titanium and Zinc, the most conspicuous instances being those of Boron, Fluorine, Arsenic, Nickel and Titanium.

Many chemists are still using, in calculating the results of analyses, factors based on the old values of the atomic weights. Now that we have an authoritative statement of these constants, it is time that the analytical factors be recalculated, To show exactly what differences will result from the use of the figures of the two columns of the International table, I have made the calculations for both sets of values. The differences except in a few instances do not affect the fourth decimal place, and for practical purposes four decimal places amply suffice. The fifth has been added for use in constructing more complete tables, in which multiples of these factors may be given. The differences between these figures and those based on the values of the atomic weights in current use are quite appreciable, affecting in many cases the third significan figure in the factor.

Such a table of factors might be indefinitely extended; I have included those most frequently required in practical analytical work. Inspection of the figures of the table will show that notable differences appear only in the cases involving the elements whose atomic weights I have pointed out as calling for correction. These are particularly Arsenic, Boron, Fluorine and Nickel.

Table of Analytical Factors.

Sought	Found	O=16*	H=1**
Aluminium	Aluminium Sesquioxide	0.53033	0.53036
Ammonia	Ammonium Chloride	0.31882	0.31877
Ammonia	Ammonium Platinic Chloride	0.076927	0.076913
Antimony	Antimony Trioxide	0.83356	0.83357
Antimony	Antimonious Sulphide	0.71424	0.71418
Antimony Trioxide	Antimonious Sulphide	0.85685	0.85678

---

* Figures based on those of the first column in the International Table.
** Figures based on those of the second column in the International Table.

Antimony Trioxide	Antimony Tetroxide	0.94744	0.94744
Arsenic	Arsenious Oxide	0.75758	0.75748
Arsenic	Arsenic Oxide	0.75217	0.65206
Arsenious Oxide	Arsenic Oxide	0.86087	0.86082
Arsenious Oxide	Arsenious Sulphide	0.80429	0.80413
Barium	Barium Oxide	0.89570	0.89572
Barium Oxide	Barium Sulphate	0.65707	0.65709
Barium Oxide	Barium Carbonate	0.77710	0.77714
Barium Oxide	Barium Silico-Fluoride	0.54825	0.54777
Bismuth	Bismuth Trioxide	0.89677	0.89676
Boron	Boric Anhydride	0.31429	0.31394
Bromine	Silver Bromide	0.42557	0.42557
Cadmium	Cadmium Oxide	0.87539	0.87543
Calcium	Calcium Oxide	0.71480	0.71480
Calcium	Calcium Carbonate	0.40060	0.40060
Calcium Oxide	Calcium Carbonate	0.56044	0.56044
Colcium Oxide	Calcium Sulphate	0.41202	0.41200
Carbon	Carbon Dioxide	0.27273	0.27273
Carbon	Calcium Carbonate	0.11988	0.11988
Carbon Dioxide	Calcium Carbonate	0.43956	0.43956
Chlorine	Silver Chloride	0.24725	0.24722
Chromium	Chromic Oxide	0.68463	0.68459
Chromic Anhydride	Chromic Oxide	1.31537	1.31541
Chromic Anhydride	Lead Chromate	0.30991	0.30989
Cobalt	Cobaltous Oxide	0.78667	0.78667
Cobalt	Cobalt and Potass. Sulphate	0.14162	0.14162
Cobaltous Oxide	Cobalt and Potass. Sulphate	0.18008	0.18002
Cobaltous Oxide	Cobaltous Sulphate	0.48386	0.48366
Copper	Cupric Oxide	0.79899	0.79894
Copper	Cuprous Sulphide	0.79869	0.79858
Cyanogen	Silver Cyanide	0.19437	0.19434
Fluorine	Calcium Fluoride	0.48718	0.48711
Fluorine	Silicon Fluoride	0.72797	0.72832
Hydrobromic Acid	Silver Bromide	0.43093	0.43093
Hydrochloric Acid	Silver Chloride	0.25428	0.25425
Hydrocyanic Acid	Silver Cyanide	0.20190	0.20187

Hydriodic Acid	Silver Iodide	0.54459	0.54459
Hydrogen	Water	0.11190	0.11186
Iodine	Silver Iodide	0.54029	0.54030
Iodine	Palladious Iodide	0.70433	0.70434
Iron	Ferric Oxide	0.69962	0.69970
Iron	Ferrous Sulphide	0.63552	0.63552
Iron Oxide (Ferrous)	Ferric Oxide	0.89987	0.89990
Lead	Lead Oxide	0.92822	0.92822
Lead	Lead Sulphate	0.68293	0.68291
Lead Oxide	Lead Sulphate	0.73574	0.73572
Lead Oxide	Lead Sulphide	0.93279	0.93275
Lithium	Lithium Oxide	0.46773	0.46783
Lithium Oxide	Lithium Carbonate	0.40589	0.40593
Lithium Oxide	Lithium Sulphate	0.27297	0.27299
Lithium Oxide	Lithium Phosphate	0.38841	0.38844
Magnesium	Magnesium Oxide	0.60357	0.60359
Magnesium	Magnesium Pyrophosphate	0.21875	0.21876
Magnesium Oxide	Magnesium Pyrophosphate	0.36243	0.36244
Magnesium Oxide	Magnesium Sulphate	0.33516	0.33515
Manganese	Manganous Oxide	0.77465	0.77469
Manganese	Manganese Proto-sesquioxide	0.72052	0.72057
Manganese	Manganese Sesquioxide	0.69620	0.69625
Manganese	Manganous Sulphide	0.63175	0.63173
Manganous Oxide	Manganous Sulphate	0.47001	0.47002
Manganous Oxide	Manganous Sulphide	0.81553	0.81546
Mercuric Oxide	Mercury	1.08000	1.08000
Mercurous Oxide	Mercury	1.04000	1.04000
Mercury	Mercuric Oxide	0.92593	0.92593
Mercury	Mercurous Oxide	0.96154	0.96154
Mercury	Mercurous Chloride	0.84944	0.84945
Mercury	Mercuric Sulphide	0.86185	0.86181
Nickel	Nickelous Oxide	0.78581	0.78593
Nitrogen	Ammonium Platinic Chloride	0.063294	0.063284
Nitrogen	Platinum (from above)	0.14415	0.14413
Nitrogen	Ammonia	0.82278	0.82280
Oxygen	Mercuric Oxide	0.074074	0.074074

Phosphorus	Phosphoric Anhydride	0.43662	0.43664
Phosphoric Acid	Phosphoric Anhydride	1.38062	1.38059
Phosphoric Anhydride	Magnesium Pyrophosphate	0.63757	0.63756
Phosphoric Anhydride	Ferric Phosphate	0.47051	0.47052
Phosphoric Anhydride	Silver Phosphate	0.16954	0.16954
Phosphoric Anhydride	Uranyl Pyrophosphate	0.19860	0.19861
Potassium	Potassium Oxide	0.83033	0.83034
Potassium	Potassium Chloride	0.52480	0.52485
Potassium	Potassium Platinic Chloride	0.16116	0.16121
Potassium Chloride	Potassium Platinic Chloride	0.30712	0.30716
Potassium Oxide	Potassium Platinic Chloride	0.19411	0.19415
Potassium Oxide	Potassium Chloride	0.63204	0.63209
Potassium Oxide	Potassium Sulphate	0.54084	0.54082
Silicon	Silicic Anhydride	0.47020	0.47031
Silver	Silver Chloride	0.75275	0.75278
Silver Oxide	Silver Chloride	0.80855	0.80857
Sodium	Sodium Oxide	0.74235	0.74238
Sodium	Sodium Chloride	0.39402	0.39408
Sodium Oxide	Sodium Chloride	0.53077	0.53083
Sodium Oxide	Sodium Carbonate	0.58530	0.58532
Sodium Oxide	Sodium Sulphate	0.43683	0.43682
Strontium	Strontium Oxide	0.84556	0.84556
Strontium Oxide	Strontium Sulphate	0.56409	0.56405
Strontium Oxide	Strontium Carbonate	0.70190	0.70189
Sulphur	Barium Sulphate	0.13733	0.13735
Sulphur	Arsenious Sulphide	0.39069	0.39089
Sulphuric Acid	Sulphuric Anhydride	1.22428	1.22499
Sulphuric Anhydride	Barium Sulphate	0.34293	0.34291
Tin	Stannic Oxide	0.78808	0.78807
Tin Oxide (Stannous)	Stannic Oxide	0.89404	0.89403
Zinc	Zinc Oxide	0.80344	0.80342
Zinc	Zinc Sulphide	0.67104	0.67094
Zinc Oxide	Zinc Sulphide	0.83521	0.83511

Laboratory Nelson, Baker & Co.,

Feb. 1904.

A Simple Quantitative Determination of Formaldehyde and Paraformaldehyde.

By *Dr. Clemens Kleber.*

Although a very great number of quantitative methods for the determination of formaldehyde have already been suggested, the following method which has been in practical use in our works for some time, may nevertheless be recommended, since it is simple, quick, accurate and cheap.

To commercial concentrated bisulphite of soda solution which generally contains a considerable quantity of free sulphurous acid, a solution of pure caustic soda, preferably made from the article purified with alcohol, is added, until the odor of sulphurous acid has completely disappeared. No special care is required in this operation, as a slight excess of caustic soda over the quantity necessary for deodorizing is immaterial. Then this solution is diluted with water, until 30 cc. of it exactly neutralize 50 cc. of normal caustic soda, using phenolphthaleïn as an indicator. Towards this solution formaldehyde behaves like an alcali and can be titrated accordingly.

For the practical analysis 5 cc. of the formaldehyde solution to be tested are put into a flask, with addition of a few drops of phenolphtaleïn solution, then the liquid which is generally somewhat acid, is exactly neutralized by a few drops of (approximately normal) caustic soda solution, and hereafter the bisulphite solution is slowly run in from a burette until the red coloration which is immediately produced has disappeared again. With the strong (about 40 p. c.) commercial solutions of formaldehyde which become sufficiently warm by the formation of the bisulphite compound, the reaction is generally complete with the decoloration and the red color does not return upon standing or heating; but in the case of weak solutions the liquid should, after decoloration, be gently warmed over a gas burner, when the red color will often return, to be removed by a few additional drops of the bisulphite solution. As 1 cc. of this latter corresponds to 0.05 g. of formaldehyde, the number of cc. used in the titration directly indicates the per cent by weight of formaldehyde in a given volume; if percentage $\frac{\text{weight}}{\text{weight}}$ is desired, this number is to be divided by the specific gravity of the formaldehyde solution, which varies not only according to the strength in formaldehyde, but also according to the quantity of methyl alcohol which is nearly always present. If, of course, 5 g. instead of 5 cc. had been used, the cc. from the titration would directly indicate percentage by weight.

The bisulphite solution can also be used to test the strength of commercial paraformaldehyde or trioxymethylene powder or tablets. About 2 grams of the substance, tablets preferably crushed to a coarse powder, are gently warmed in a flask with a few cubiccentimeters of water, then phenolphtaleïn is added and the bisulphite solution slowly run in with constant shaking, until the solid substance is completely dissolved with production of the red color and the latter has finally completely disappeared. 1 cc. of the bisulphite solution is then equivalent to 0.05 g. of paraformaldehyde. The whole operation requires only a few minutes and the end reaction is sharp if the caustic soda used for neutralisation of the free sulphurous acid was fairly free from carbonic acid.

The standard solution of bisulphite keeps well for a long time with the usual precautions against evaporation and rapid oxidation; for, as it contains nearly twice as much bisulphite as would be required to produce the bisulphite compound of formaldehyde, because formaldehyde is able to form this compound also from neutral sulphites with production of free alcali, and one half of the acidity of the solution serves only to neutralize this latter, it is evident that a moderate oxidation to sulphate with production of free sulphurous acid (if the solution contained only bisulphite and no neutral sulphite) would not influence the acidity of the standard solution. As, however, free sulphurous acid might be gradually volatilized, it is advisable, to use the solution only as long as it does not develop a stronger odor of sulphurous acid. Such deterioration is much delayed by using from the beginning a moderate excess of caustic soda over the amount required to deodorize the liquid.

Laboratories of The Heyden Chemical Works,
Garfield, N. J.

The Proposed Volatile Oils of the U. S. P. 1900.

By *Edward Kremers.*

XXXII. OLEUM SINAPIS VOLATILE.

Volatile Oil of Mustard.[1])

A volatile oil[3]) *obtained from Black Mustard*[2]) *by maceration with water and subsequent distillation.*

It should be carefully kept in well-stoppered bottles, in a cool place, protected from light.[4])

A colorless or pale yellow,[5]) *limpid, and strongly refractive liquid, having a very pungent and acrid odor*[6]) *and taste.*[7])

Specific gravity: 1.018 to 1.029 at 15° C. (59° F.)[8])

Boiling point: 148° to 150° C. (298.4° to 302° F.)[9])

Freely soluble in alcohol, ether, or carbon disulphide,[10]) *the solutions being neutral to litmus paper.*[11])

If to 3 gm. of the oil 6 gm. of sulphuric acid begradually added, the liquid being kept cool, the mixture, upon subsequent agitation, will evolve sulphur dioxide, but will remain of a light yellow color, and at first perfectly clear, becoming afterwards thick and occasionly crystalline, while the pungent odor ot the oil will disappear.[12])

If a portion of the oil be heated in a flask connected with a well-cooled condenser, it should distil completely between 148° and 150° C. (298.4° and 302° F.), and both the first and the last portion of the distillate should have the same specific gravity as the original oil (absence of alcohol, chloroform, carbon disulphide, petroleum, or fatty oils.)[13])

If a small portion of the oil be diluted with 5 times its volume of alcohol, and a drop of ferric chloride T. S. be added, no blue or violet color should be produced (absence of phenols).[14])

If a mixture of 3 gm. of the oil and 3 gm. of alcohol be shaken, in a small flask, with 6 gm. of ammonia water, it will be clear after standing for some hours, or rapidly when warmed to 50° C. (122° F.), and usually deposit, without becoming colored, crystals of thiosinamine (allyl-thio-urea, $CS.N_2H_3(C_3H_5)$).[15])

To determine the proportion of thiosinamine obtainable from the oil, decant the mother-water from the crystals, and evaporate it gradually in a tared capsule, on a water-bath, adding fresh portions only after the ammoniacal odor of each preceding portion has disappeared. Then add the crystals from the flask to those in the capsule, rinsing them out of *the flask with a little alcohol, and heat the capsule an a water-bath until its weight remains constant. The amount of thiosinamine thus obtained from 3 gm. of the oil should be not less than 3.25 gm., nor more than 3.5 gm. After cooling, theosinamine forms a brownish, crystalline mass, fusing at 70° C. (158° F.), and having a leek-like, but no pungent, odor. The mass should be soluble in 2 parts of warm water, forming a solution which should not redden blue litmus paper, and which possesses a somewhat bitter, not persistent taste.*[16])

PREPARATION: *Linimentum Sinapis Compositum.*

1) This oil is officinal in all pharmacopoeias but the French. In the U. S. P. it has been officinal since 1880.

2) Black mustard is defined by the U. S. P. as "The seed of *Brassica nigra*" (Linné), Koch (nat. ord. *Cruciferae*). According to G.-H.-K., (p. 409), the designation "black" mustard also applies to the seeds from *B. juncea* Hooker fil. et Thompson. The mustard which is used in the manufacture of mustard oil is obtained either from *B. n.*, which is cultivated in Holland, Apulia or the Levant, or more frequently from *B. j.*, which is cultivated on a large scale in Sarepta, in the Russian gouvernement Sarantow, also in East India.

3) According to several pharmacopœias, viz. Austr., Bel., Norw., Rom. and Russ., the seeds should be deprived of their fatty oil before being macerated and distilled.

Mustard oil is not contained as such in the seeds, but is formed by ferment action. The ground mustard seed is deprived of its fatty oil with the aid of hydraulic presses. The press-cakes are mixed with tepid water and allowed to undergo fermentation, and then distilled with water vapor. The yield varies between 0.5—0.75 p. c. of the original seed.

At a temperature exceeding 70° no fermentation takes place, because the myrosin is coagulated and rendered inactive.

The fermentation is brought about by the albuminoid ferment, myrosin, which acts on the sinigrin in the presence of water with the formation of mustard oil, dextrose and potassium acid sulphate.

$$\underset{\text{Sinigrin}}{C_{10}H_{16}NS_2KO_9} + \underset{\text{Water}}{H_2O} = \underset{\text{Mustard oil}}{CSNC_3H_5} + \underset{\text{Dextrose}}{C_6H_{12}O_6} + \underset{\text{Potassium acid sulphate}}{KHSO_4}$$

Beside this reaction others take place resulting in the formation of allyl cyanide and carbon disulphide, which are never entirely wanting in the oil. Contact with the copper of the still, or prolonged contact with water causes the separation of sulphur and the formation of allyl cyanide.

C_3H_5NCS	+	Cu	=	C_3H_5CN	+	CuS
Mustard oil		Copper		Allyl cyanide		Copper sulphide.

When the distillation has been conducted in a careless manner, the amount of allyl cyanide can be so large that the oil becomes lighter than water (Will,* 1863). (Sp. gr. of allyl cyanide is 0.835 at 17.5°.)

How the carbon disulphide always found in the oil (in the artificial oil as well) is formed, has not yet been clearly demonstrated. It has been shown† that when mustard oil is boiled with water for an hour in a flask connected with a reflux condenser no carbon disulphide is formed. This substance, however, is formed in appreciable quantities together with carbon dioxide when mustard oil is heated for several hours with water in sealed tubes under pressure at a temperature of 100—105°. It may be assumed that in the nascent state mustard oil has a greater capacity for reaction and that in this condition. Water may effect its decomposition in a manner expressed by the following equation.

$2C_3H_5NCS$	+	$2H_2O$	=	$2C_3H_5NH_2$	+	CO_2	+	CS_2
Mustard oil		Water		Allyl amine		Carbon dioxide		Carbon disulphide.

Carbon disulphide is also formed by prolonged contact of water with mustard oil.

Besides small variable amounts of allyl cyanide and carbon disulphide, mustard oil consists almost entirely of allyl mustard oil or allyl isothiocyanate, C_3H_5NCS. Possibly traces of the isomeric allyl thiocyanate, and higher boiling (polymeric?) unknown compounds are present.

4) The usual precautions.

5) "Of a yellowish color." Ph. G.

6)

7) In as much as mustard oil draws blisters when in contact with the skin, it might be best to omit any reference to taste from the description. Thus the Ph. G. does not describe the taste of the oil. The P. Br. describes the taste as acrid but follows it up immediately with a statement of its vesicative properties.

8) The specific gravities recorded by the several pharmacopœias are as follows:

---

* Liebig's Annalen, 125, p. 278.

† Archiv d. Pharm., 235, p. 52.

1.009—1.017	Port.
1.01	Hisp., Rom.
1.01 —1.02	Austr.
1.015—1.022	Ndl.
1.015—1.025	Dan., Norv.
1.016—1.020	Japon.
1.016—1.022	Fenn., Hung., Russ.
1.017—1.020	Belg.
1.018—1.025	Germ.
1.018—1.029	U. S.
1.018—1.030	Br.
1.020—1.025	Helv.

"The sp. gr. varies in accordance with the method of preparation between 1.016 and 1.022 and sometimes rises up to 1.030." (G.-H.-K., p. 414).

"Sp. gr. 1.015 to 1.030." (Parry, p. 330.)

"Density at 15° 1.016—1.032." (C.-D.-P., p. 952.)

9) The b. p. requirements of the several pharmacopœias are herewith tabulated:

143° (?)	Port.
147°	Rom.
147.2°—152.2°	Brit.
148°	Austr., Hisp., Japon.
Not below 148°	Fenn.
148°—150°	Russ., U. S.
148°—151°	Dan.
148°—152°	Germ.
Below 150°	Hung.

Compare also statements under No. 13.

10) The P. Br. gives no solubility requirement whatever, the P. Ger. demands that it form a clear solution with alcohol in all proportions.

11) Neither the British nor the German pharmacopœias mention its neutrality to litmus.

22) The same test has been adopted by the German but not by the British Pharmacopœia. "In the presence of petroleum, petroleum ether, chloroform or undue amounts of CS_2, the mixtuce of mustard oil and sulphuric acid is rendered turbid and upon standing forms two layers. Other volatile oils would be rendered dark in color by the sulphuric acid." (G.-H.-K., p. 415.)

13) This test has been adopted by the British but not by the German Pharmacopœia. The British limits — 147.2° to 152.2° — are evidently due to the statement in Fahrenheit degrees, viz. 297° and 306°, the closest approximation in whole numbers to the U. S. P. requirement. Pure allyl iso-thiocyanate boils at 151°.[*]

14) This test has been adopted by the German but not by the British Pharmacopœia.

15) This test has not been adopted by either the British or German pharmacopœias.

"Attention should be called to the fact that, by following this test, carbon disulphide is included in this estimation since it also unites with ammonia according to the following equation:

$$\underset{\text{Carbon Disulph.}}{CS_2} + \underset{\text{Ammonia.}}{4NH_3} = \underset{\text{Ammonium Sulphocyanate.}}{NH_4SCN} + \underset{\text{Ammonium Sulphide.}}{(NH_4)_2S}$$

"In as much as the products of the reaction remain behind upon evaporation, the residue may weigh more than 3.5 gms. If this is the case and especially if the residue has the odor of ammonium sulphide an unwarranted amount of carbon disulphide was probably presents." (G.-H.-K., p. 415.)

16) The British Pharmacopœia has no quantitative test, the German Pharmacopœia has adopted Gadamer's titrimetric method[†] (1896) for the assay of spirit of mustard oil.

A solution of 2 p. of mustard oil in 98 p. of alcohol (*Spiritus sinapis* Ph. G.) is first prepared. 5 cc. of this spirit (4.2 g.) are transferred to a 50 cc. measuring flask, and 25 cc. of N/10 silver nitrate V. S. and 5 cc. ammonia are added. The flask is well stoppered and set aside for 24 hours. The liquid is then diluted to the 50 cc. mark and filtered. 25 cc. of the filtrate, after the addition of 4 cc. of nitric acid and a few drops of ferric chloride T. S., should not require more than 4.5 cc. and not less than 4.1 cc. of N/10 ammonium sulphocyanate to produce a permanent red color. These numbers — 4.1 and 4.5 — correspond to the requirements of the Ph. G., viz. a content of 92.6 to nearly 100 p. c. of allyl mustard oil.

Adulterants, Besides alcohol, carbon disulphide, castor oil, petroleum etc. which are reported as being used as adulterants, artificial allyl isosulphocyanate may be found. When perfectly pure, it, no doubt, defies detection. Tests based on its impurities, if present, do not appear to have been devised.

---

[*] Parry, p. 330.

[†] Arch. d. Pharm., 237, pp. 110 & 372.

The Sesquiterpenes.*

A monograph by *Oswald Schreiner.*

18. Patchoulene.†

Patchoulene does not occur in nature but is prepared by dehydrating the socalled patchouly camphor, more correctly termed patchouly alcohol by Wallach. Gal[1] in 1869 obtained from this alcohol by dehydration a hydrocarbon boiling at 248—252°, to which he assigned the formula $C_{15}H_{26}$. Montgolfier[2] in 1877 also obtained the hydrocarbon from patchouly camphor and recognized its nature as a sesquiterpene, $C_{15}H_{24}$. Wallach and Tuttle[3] further investigated the sesquiterpene in 1894, but so far it has not been sufficiently well characterized to be designated as a chemical individual.

Preparation. Gal prepared the hydrocarbon by treating patchouly alcohol with zinc chloride. Montgolfier simply heated a solution of the alcohol in glacial acetic acid to 100° for several hours. The hydrocarbon separated in a layer, was washed and purified. Wallach and Tuttle prepared patchoulene by heating the alcohol with potassium bisulphate in a paraffin bath to 180° for one and one-half hours. The separated hydrocarbon was washed and purified in the usual way.

Properties. Patchoulene has a cedar-like odor resembling the cedrene obtained from cedarwood. It is slightly soluble in alcohol and glacial acetic acid, soluble in all proportions in ether, benzin etc., and has the following physical constants:

Gal (1869): B. p. 248—252°.

Montgolfier (1877): B. p. 252—255° (743 mm.), $d_{0°} = 0.946$, $d_{18.5°} = 0.937$; $[\alpha]_D = -42° 10'$.

Wallach (1894): B. p. 254—256°; $d_{28°} = 0.939$; $n_D = 1.50094$.

The molecular refraction $= 64.02$; calculated for $C_{15}H_{24}|^{=} = 64.45$.

According to Montgolfier patchoulene does not combine with hydrochloric acid. Wallach and Tuttle report no chemical work.

Sesquiterpene hydrate yielding patchoulene. Patchouly alcohol. This alcohol, formerly called patchouly camphor, separates occasionally from patchouli oil on long standing. Gal in 1869 studied this substance and gave it the formula $C_{15}H_{28}O$. Montgolfier in 1877 recognized the compound as being isomeric with the so-called cubeb and cedar camphor and gave it the formula $C_{15}H_{26}O$. Wallach[4] in 1892 proposed the name of patchouly alcohol.

---

* Continued from Pharm. Review, Vol. 22, p. 60,

† Montgolfier, C. r. 84, p. 88. Sometimes called patchoulin (Beilstein III, p. 538).

[1] Compt. rend., 68, p, 806; Ann., 150, p. 374.

[2] Compt rend., 84, p. 88.

[3] Ann., 279, p. 394.

[4] Ann. 271, p. 299.

Properties. Patchouly alcohol is soluble in alcohol and ether and crystallizes in well developed hexagonal prisms ending in sixsided pyramids. It has been found to have the following properties;

Gal (1869): M. p. 54—55°; b. p. 296°; $d_{4.5°} = 1.051$; $[\alpha]_D = -95.79°$ in a 19 p. c. alcoholic solution.

Montgolfier (1877): M. p. 59°; d = about 1.0; $[\alpha]_D = 118°$, somewhat less in alcoholic solution.

Wallach and Tuttle (1894): M. p. 56°.

Patchouly alcohol decomposes very readily into water and hydrocarbon. The weakest dehydrating agents, such as dilute sulphuric or hydrochloric acids, or acetic acid anhydride in the cold or simply heating the compound, will readily split off water, although this is best accomplished by the method described above for the preparation of patchoulene. The behavior of patchouli alcohol shows that the hydroxyl is in a tertiary position. According to Wallach and Tuttle the compounds produced by replacing the hydroxyl by halogen are exceedingly unstable and split off halogen acid immediately.

19. Rhodiene.

Gladstone[1] obtained from oil of rhodium[2] (rosewood) a sesquiterpene of the following properties:

B. p. 249°; $d_{20°} = 0.9042$; $\alpha_D = -11°$; $n_c = 1.4911$.

It had an odor of sandalwood and roses and combines with hydrochloric acid, but no hydrochloride of definite composition could be obtained.[3]

20. Santalenes.

History and General Discussion.

The hydrocarbons known as α- and -santalene have so far been found only in sandalwood oil. This oil has been investigated by a number of chemists during the last twenty years, but the literature on the subject is quite contradictory. As far as the sesquiterpenes contained in the oil are concerned, Guerbet has shown that there are two, the α- and β-santalene mentioned above. These he has definitely characterized by the preparation of several derivatives.

---

[1] Journ. Chem. Soc., 17, p. 1; Brühl, Ber., 21, p. 148 table.

[2] According to Gildemeister and Hoffmann, Die Aeth. Oele, p. 773, oil of rhodium is often a mixture of sandalwood or cedarwood oil with rose oil. There is no evidence that the oil examined by Gladstone was true oil of rhodium, distilled from *Convolvulus scoparius*.

[3] Pharm. Journ., 31, pp. 687, 688.

The nature of the oxygenated constituents is still a matter for discussion, but as some observers claim them to be sesquiterpene hydrates, yielding sesquiterpenes by dehydration, it will be well to consider them in this connection and to give a brief exposition of these conflicting views.

Chapoteaut[1] in 1882 separated oil of sandalwood into two fractions, an aldehyde boiling about 300° and having the formula $C_{15}H_{24}O$, and an alcohol boiling about 310°, of the formula $C_{15}H_{26}O$. These two compounds, when treated with phosphoric acid anhydride, yield hydrocarbons, $C_{15}H_{22}$ (b. p. 245°) and $C_{15}H_{24}$ (b. p. 260°) respectively. The first of these he considers as probably identical with cedrene, the second with the sesquiterpene of cobaiba oil.

Chapman and Burgess[2] in 1896 isolated a fraction boiling at 301—306°, which they consider to be an aldehyde, santalal, $C_{15}H_{24}O$. Its properties were as follows: $d_{\frac{15^\circ}{15^\circ}} = 0.9793$, $d_{\frac{20^\circ}{20^\circ}} = 0.9761$; $[\alpha]_D = -14^\circ 42'$; $n_{H\alpha} = 1.5051$, $n_D = 1.5085$. By treatment with phosphorus pentoxide a hydrocarbon, $C_{15}H_{22}$, of the following properties, was obtained: $d_{\frac{15^\circ}{15^\circ}} = 0.9359$; b. p. 140—145° (25 mm.): $\alpha_D = +5^\circ 45'$. This hydrocarbon was unsaturated, combined with hydrohalogen, oxides of nitrogen and nitrosyl chloride, but no definite compounds could be obtained. The authors compared the hydrocarbon with cedrene from cedarwood oil, und conclude that it is similar to but not identical with this hydrocarbon.

The chemists of Schimmel & Co.[3] prepared santalol, the alcohol of sandalwood oil, by saponification of the oil and distillation in a vacuum. The crude santalol was further purified by converting it into santalyl phthalic acid, from which it was regenerated by saponification. The product thus obtained could be separated by distillation in a vacuum into fractions which differed in rotatory power from —7° 20′ to —32° 36′. These chemists, therefore, concluded that santalol was a mixture of two alcohols, of which the lower boiling one is inactive or perhaps even dextrogyrate, the higher boiling one, strongly laevogyrate. In a later report[4] they question the formula $C_{15}H_{26}O$ for santalol, since a sample purified as stated above gave on acetylization a result corresyonding to 103.5 p. c. of santalyl acetate. They conclude that santalol either has a different composition (possibly $C_{15}H_{22}O$), or else it is a mixture of nonisomeric alcohols of different composition.

---

[1] Bull. Soc. chim., (2) 87, p. 858.

[2] Ber. v. S. & Co., April 1899, p. 48.

[3] Proc. Chem. Soc., 4896, p. 140; Chem. News, 74, p. 95.

The results of v. Soden and Müller[5] published at nearly the same time, corroborate the statement of Schimmel & Co., concerning santalol being a mixture. These chemists also isolated a sesquiterpene from sandalwood oil, to which they gave the name santalene.

Guerbet[6] in 1900 isolated from sandalwood oil two sesquiterpenes which he designated as α- and β-santalene, the latter being the same as the santalene of v. Soden and Müller. By the preparation of nitrosochlorides and nitrol piperidine bases, he was able to characterize these compounds. The oxygenated portion of the oil he found to consist of an aldehyde, santalal, and two sesquiterpene hydrates, α- and β-santalol. These santalols, when treated with phosphoric acid anhydride, yield sesquiterpenes, which Guerbet has called α- and β-isosantalene respectively.

In the same year v. Soden[7] published somewhat different results. He also succeeded in separating santalol into two alcohols, of which one has the formula $C_{15}H_{24}O$, and he considers it likely that the other alcohol, which has not been prepared in a pure form, will have this same composition, whereas Guerbet considered the alcohols as compounds $C_{15}H_{26}O$. If v. Soden's formula $C_{15}H_{24}O$ is correct for α- and β-santalol then the isosantalenes obtained from them cannot be sesquiterpenes as Guerbet supposes.

The results obtained by these various investigators may be briefly summarized as follows:

Chapoteaut (1882): aldehyde, $C_{15}H_{24}O$; alcohol, $C_{15}H_{26}O$.

Chapman and Burgess (1896): santalol (aldehyde) $C_{15}H_{24}O$.

Schimmel & Co. (1899—90): Santalol consists of two alcohols; formula possibly $C_{15}H_{22}O$, or else a mixture of nonisomeric alcohols of different composition.

v. Soden and Müller (1899): Santalene, $C_{15}H_{24}$; Santalol consists of two alcohols.

---

[4] Ber. v. S. & Co., April 1900. p. 47.

[5] Pharm. Ztg., 44, p. 258.

[6] Compt. rend. 130, pp. 417, 1324; Bull. Soc. chim., (3) 23, pp. 218, 540..

[7] Arch. d. Pharm., 288, p. 358.

Guerbet (1900): α- and β-santalene, $C_{15}H_{24}$; santalol (aldehyde), $C_{15}H_{24}O$; α- and β-santalol, $C_{15}H_{26}O$.

v. Soden (1900): Santalol consists of two alcohols $C_{15}H_{24}O$.

This summary clearly shows the contradictory nature of the various reports. Whether this is due to a varying composition of the oil. or to the impure compounds subjected to analysis, must be left for further work to be decided. None of the above investigators probably had an absolutely pure chemical unit under consideration, as the separation was accomplished by repeated distillation the boiling points of the alcohols being quite close together.

α- and β-Santalene.

Preparation.

The santalenes have been prepared only by fractional distillation from sandalwood oil. Guerbet[6] prepared the sesquiterpenes as follows: Oil of sandalwood is saponified with alcoholic potash, and the product well washed with water and dried with potassium carbonate. This saponified oil is then subjected to several fractionations under diminished pressure. The oil is thus separated into groups of fractions, the first group passing between 110—180° (38 mm.) and the second between 180—200° (38 mm.). The first consists chiefly of hydrocarbons, the second of oxygenated constituents.

Separation of α- and β-santalenes. The hydrocarbon fraction from the sandalwood oil was then fractionated many times, at first in a vacuum, and later under atmospheric pressure, using a Le Bel-Henninger distilling column. Proceeding in this manner, Guerbet was able to separate the hydrocarbon fraction into two distinct sesquiterpenes, differing about ten degrees in boiling point, and yielding different derivatives. Guerbet, as stated, distinguished between them by calling the lower boiling hydrocarbon, α- and the higher boiling hydrocarbon, β-santalene.

This latter compound had already been prepared by v. Soden and Müller in 1899 by repeated fractionation of the saponified oil, and called by them, santalene.

Physical Properties.

According to Guerbet[6] and also to v. Soden and Müller[5] the physical properties of the santalenes are as follows:

α-Santalene.

Guerbet (1900): B. p. 252—252.5; $d_{0^\circ} = 09134$; $\alpha_D = -13.98^\circ$.

β-Santalene.

v. Soden and Müller (1899): B. p. 261—262°; $d_{15^\circ} = 0.898$; $\alpha_D =$ about -21°.

Guerbet (1900): B. p. 261—262°; $d_{0^\circ} = 0.9139$; $\alpha_D = -28.55^\circ$.

According to v. Soden and Müller the β-santalene is soluble in about 16 parts of 90 p. c. alcohol and readily soluble in chloroform, ether, benzene, and petroleum ether.

Chemical Properties and Derivatives.

The santalenes combine with two molecules of hydrohalogen or bromine, but no crystalline derivatives have been obtained. The hydrate and acetate are likewise liquid compounds. Guerbet succeeded in preparing nitrosochlorides of both the α- and β-santalene and from these the nitrolpiperidine base. β-santalene yielded two distinct nitrosochlorides, which were separated by fractional crystallization from alcohol. A nitrosate could not be obtained. According to Guerbet both sesquiterpenes oxidize readily in the air and give a color reaction which is quite different from that given by cadinene. Santalene when dissolved in glacial acetic acid and treated with a drop or two of sulphuric acid, gives a currant red color, which becomes deeper and finally changes to brown after standing several hours. Cadinene under the same conditions gives a fine green color, changing to blue, and on heating to red.

Santalene dihydrochloride, $C_{15}H_{24}2HCl$. H. v. Soden and Müller[11] mention the addition of two molecules of hydrochloric acid to santalene (β-santalene, Guerbet), but they did not obtain it in pure form. Guerbet[12] reports more fully, but also had only impure liquids under consideration, as the dihydrochlorides resisted all attempts at purification. He proceeded as follows: Dry hydrochloric acid gas was passed into a well cooled solution of santalene in ether up to saturation, and the solution allowed to stand for a time. The ether was then evaporated and the oil kept for a long time in a vacuum over caustic potash. An analysis of this impure product gave results agreeing quite well with the formula $C_{15}H_{24}2HCl$. By distillation in a vacuum the hydrochloride decomposes.

---

[11] Pharm. Ztg., 44, p. 259.

[12] Bull. Soc. chim., (3) 28, p. 541.

The rotatory power of the santalenes has suffered an inversion by going over into the dihydrochlorides:

α-Santalene, $\alpha_D = +6°$.
β-Santalene, $\alpha_D = +8°$.

Santalene nitrosochlorides, $C_{15}H_{24}.NOCl$. H. v. Soden and Müller[13] did not succeed in the preparation of this derivative. Guerbet[14] states that the general method of Wallach gave but an insignificant yield. He obtained a yield of about 50 p. c. by dissolving the santalene in petroleum ether and adding to this a solution of nitrosyl chloride in the same solvent, keeping the mixture at a low temperature.

α-Santalene nitrosochloride. α-Santalene yields only one nitrosochloride. It is crystalline, insoluble in alcohol, and only slightly soluble in ordinary ether, but very soluble in petroleum ether and in benzol. From a solution in the latter solvent it is deposited in small, short prismatic crystals, melting at 122° with decomposition. It yields a nitrolpiperidine base.

β-Santalene nitrosochlorides. β-Santalene yields two isomeric nitrosochlorides. Both are soluble in alcohol, which fact distinguishes them from α-santalene nitrosochloride. They are also more stable when heated and can be melted without decomposition.

The two isomeric β-santalene nitrosochlorides are separated by fractional crystallization from 95 p. c. alcohol. The nitrosochloride least soluble in the alcohol, crystallizes in large striated tablets and melts at 152°; the other, present in much larger quantity, crystallizes in prismatic needles, melting at 106°. Both yield nitrolpiperidine bases.

Santalene nitrolpiperidines, $C_5H_{24}(NO)NC_5H_{10}$. Guerbet obtained three distinct nitrolpiperidine bases by treating the three nitrosochlorides with piperidine.

α-Base. This was obtained from the α-santalene nitrosochloride by treating with piperidine in benzene solution. It is very soluble in alcohol, from which it crystallizes in fine needles melting at 108—109°.

β-Bases. There are two β-bases obtained from the two β-nitrosochlorides described above. Both are soluble in alcohol and melt at 101° and 104—105° respectively.

---

[13] Pharm. Ztg., 44, p. 259.
[14] Bull. Soc. chim., (3) 23, p. 541.

Santalene acetates, $C_{15}H_{24}C_2H_4O_2$. According to Guerbet, when α- and β-santalenes are heated to 180—190° in sealed tubes with glacial acetic acid, the sesquiterpenes slowly combine with it to form acetates. Guerbet obtained, however, a yield of only 2.5 p. c. The acetates are colorless liquids of agreeable odor.

α-Acetate boils at 164—165° (14 mm.).

β-Acetate boils at 167—168° (14 mm.).

Santalene hydrate, $C_{15}H_{25}OH$. Guerbet could not prepare a hydrate of α- and β-santalene as had been done by v. Soden and Müller[15] with santalene (β-santalene, Guerbet). These chemists prepared a hydrate by a method simiiar to that described for caryophellene hydrate (see this). From the product of the reaction these chemists isolated a small amount of an alcohol, $C_{15}H_{25}OH$. It had an odor resembling cedarwood oil and the following constants:

B. p. 160—165° (7 mm.); $d_{15} = 0.978$; optically inactive.

α- and β-Iso-Santalene.

Guerbet[16] obtained α- and β-iso-santalene by the dehydration of α- and β-santalol respectively. The compound corresponding to the α-santalol of Guerbet (and possibly also β-santalol) is, however, considered as an alcohol of the formula $C_{15}H_{24}O$, by v. Soden.[17] Should this be true, the hydrocarbons obtained by dehydration from these alcohols, would have the formula $C_{15}H_{22}$, and would, therefore, not fall into the class of the sesquiterpenes.

According to Guerbet, phosphoric acid anhydride acts very violently on the santalols, but by cooling with ice water before adding the dehydrating agent, the reaction can be moderated. At best the yield of hydrocarbon is small, amounting to about 42 p. c. of the crude hydrocarbon. This crude hydrocarbon is purified by rectification under reduced pressure.

The iso-santalenes are colorless liquids of a terebinthinate odor and have the following properties:

α-Iso-santalene; b. p. 255—256°; $\alpha_D = +0.2°$.

β-Iso-santalene; b. p. 259—260°; $\alpha_D = +6.1°$.

Alcohols yielding the iso-santalenes. Santalol (Gonorol).[18] Schimmel & Co.[19] prepare santalol by heating East Indian sandalwood oil with an equal weight of phthalic acid anhydride and benzene for one hour to 80° on a water bath. The acid esters formed are combined with alkali and dissolved in much water. This aqueous solution is then shaken three times with ether to remove the non-alcoholic constituents. The acid esters are then again liberated by treating with dilute sulphuric acid and after separating they are saponified with alcoholic potash and washed with water.

---

[15] Pharm. Ztg., 44, p. 259.

[16] Bull. Soc. chim., (3) 23, p. 543.

[17] Arch. d. Pharm., 248. p. 353.

[18] Trade name given by Heine & Co.

[19] Ber v. S. & Co., April 1889, p. 43.

Guerbet[20] saponified the oil and separated it into two fractions by several distillations under diminished pressure, as already described under santalene. The higher boiling fraction was then treated in a manner similar to that employed by Schimmel & Co.

H. v. Soden[21] also saponified the oil and then separated the santalol from the sesquiterpenes by repeated distillation under diminished pressure.

Separation into α- and β-santalol. Schimmel & Co., and also v. Soden and Müller, showed that santalol was a mixture of alcohols. Guerbet[22] succeeded in separating santalol into two alcohols, $C_{15}H_{26}O$, which he considered as isomeric, by repeated fractionation under diminished pressure. These alcohols Guerbet distinguished as α- and β-santalol, H. v. Soden[23] separated the oil into a number of fractions by repeated distillation. In this way he was able to effect a partial separation of α- and β-santalol. The β-santalol was not prepared in a purer condition, but the crude α-santalol was purified by converting it into an acid ester of phthalic acid, much in the same manner as already described for santalol, and then fractionating under diminished pressure.

The physical properties of these alcohols are as follows: The results of Guerbet and v. Soden only are given as these chemists had undoubtedly purer products under consideration than earlier workers, and also because the alcohols having these specific properties were used in the preparation of the iso-santolenes described above.

α-Santalol.

Guerbet: formula $C_{15}H_{26}O$; b. p. 162—163° (13 mm.), 300—301° (760 mm.); $d_{0°} = 0.9854$; $\alpha_{D} = -1.20°$.

v. Soden: formula $C_{15}H_{24}O$; b. p. 155° (8 mm.), 301—302° (752 mm.); $d_{15°} = 0.977$; $\alpha_{D} = +1° 40'$ to $2° 4'$.

---

[20] Bull. Soc. chim., (3) 23, p. 218.
[21] Arch. d. Pharm., 238, p. 357.
[22] Bull. Soc. chim., (3) 23, p. 23, pp. 219, 543.
[23] l. c.

β-Santalol.

Gourbet: formula $C_{15}H_{26}O$; b. p. 170–171 (14 mm.), 309–310 (760 mm.); $d_{0°} = 0.9868$; $\alpha_D = -56°$.

21. Sesquiterpene of Ageratum Oil.

The oil distilled by van Romburgh* from the fresh herb of *Ageratum conyzoïdes* has the sp. gr. 1.015 at 27.5°; $\alpha_D = -2.75°$ and boils at about 260°. The oil probably contains compounds belonging to the group of sesquiterpenes.

22. Sesquiterpene from Amyrol.

H. v. Soden and Rojahn[1] obtained a sesquiterpene from amyrol by the action of acid agents, but no statements as to its properties are made.

Amyrol. This sesquiterpene alcohol is obtained from West Indian sandalwood oil, which is not a true sandalwood oil, but a product of *Amyris balsamifera*, nat. ord. *Rutaceæ*. Its similarity to East Indian sandalwood oil gave rise to the supposition that it also contained sesquiterpene alcohols. This suspicion was verified by Dulière[2] in 1897 who acetylized the oil and then saponified the acetic esters formed. On the basis of his results he calculates 42 p. c. of alcohol as santalol.

In 1900 v. Soden[3] isolated from the oil by fractional distillation under diminished pressure, an alcohol $C_{15}H_{25}OH$, which was different from santalol, and for which he proposed the name of amyrol. It had a specific gravity of 0.980–0.982 at 15° and a rotation of about +27°; it boiled at 299–301 (748 mm.), 151–152° (11 mm.). Attempts to prepare the phthalic acid ester failed, water bring split off and a sesquiterpene generated. The acetylization is not quantitative for the same reasons.

In a second communication by v. Soden and Rojahn[4] amyrol is reported as consisting of two sesquiterpene alcohols. The two alcohols were separated by repeated fractional distillation. The higher boiling alcohol has the composition $C_{15}H_{25}OH$. It is very viscous and has a peculiar aromatic odor and the following properties:

$$d_{15°} = 0.987;\ \alpha_D = +36°;\ \text{b. p. } 299°.$$

---

* Ber. v. S. & Co., April 1898, p. 57.

[1] Pharm. Ztg., 145, pp. 229, 878.

[2] Bull. d. l'academie roy. d. Méd. d. Belgique, (4), 9, p. 769.

[3] Pharm. Ztg., 45, p. 229.

[4] Pharm. Ztg., 45, p. 878.

With dehydrating agents, such as mineral acids, etc., it yields a sesquiterpene. The lower boiling alcohol appears to have the composition $C_{15}H_{28}OH$ and to be optically inactive. Distilled with acid agents, a hydrocarbon results, which they suspect to be l-cadinene.

23. Sesquiterpene of Angelica Root Oil.

Beilstein and Wiegand[1] in 1882 obtained from the oxygen containing portions of angelica root oil, boiling above 200°, by treatment with metallic sodium, a fraction which boiled for the greater part at about 250° and corresponded to the formula (C_5H_8).

In 1896 Ciamician and Silber[2] subjected the higher boiling fractions of angelica root oil to an examination. One of the fractions on standing deposited crystals melting at 74—77°. The fraction was distilled in a vaccuum and then saponified with alcoholic potassa. The unsaponified portion boiled between 240 and 270° and had the characteristic odor of the sesquiterpenes. It was not further investigated.

24. Sesquiterpene of Basilicum Oil.

According to van Romburgh[3] the variety *Selasih besar* of *Ocimum basilicum*, yields an oil which contains, besides methyl-chavicol, eugenol and an olefinic terpene, called ocimene, a higher boiling compound which probably is a sesquiterpene. Further work on this body is promised.

25. Sesquiterpene of Calamus Oil, Japanese.

According to Schimmel & Co.[4] the oil of Japanese calamus from *Acorus spuriosus* boils between 210—290°. The higher boiling portions are described as having a "peculiar sesquiterpene odor." Possibly this hydrocarbon is identical with calamene from ordinary calamus oil.

26. Sesquiterpene of Carline Thistle Oil.

Carline thistle yields about 2 p. c. of a volatile oil which boils for the greater part between 265—300°. Its sp. gr. is 1.03 at 18°. By distillation in a vacuum and treatment with metallic sodium, Semmler[5] in 1889 isolated a hydrocarbon belonging to the series

---

[1] Ber., 15, p. 1741.

[2] Ber., 29, p. 1811.

[3] Koninklijke Akademie von Westenschappen te Amsterdam, 1900, p. 446; Ber. v. S. & Co., Apr. 1901, p. 11.

[4] Ber., S. & Co., April 1889, p. 7.

[5] Chem. Ztg., p. 1158; Pharm. Ztg., 1888, p. 643; Jahresb. f. Pharm., 1889, p. 357.

(C_5H_8), boiling at 250—253° under ordinary pressure and having a vapor density of 6.78 and 6.82. Its specific gravity is very low for a sesquiterpene, being only 0.8733 at 22.8°. The hydrocarbon which is present to the extent of 12 p. c. in the crude oil, readily absorbs the halogens and hydrohalogens; conc. nitric acid acts very violently upon it. No crystalline derivatives of any kind were obtained.

These data are insufficient to establish its relationship with zingiberene but, if not identical with the latter, it doubtless belongs to the same group of sesquiterpenes.

27. Sesquiterpene from Caryophyllene Dihydrochloride.

Schreiner and Kremers[1] attempted to regenerate caryophyllene from its dihydrochloride in a manner similar to that employed for the regeneration of cadinene from its dihydrochloride. Instead of caryophyllene they obtained an oil of different properties. When some of the oil, dissolved in petroleum ether, was treated with a saturated solution of sodium nitrite and glacial acetic acid, the petroleum ether layer turned a beautiful blue, as it does in the case of the nitrosite of caryophyllene, but no crystals could be obtained. Attempts to prepare other caryophyllene derivatives likewise failed. Its physical properties are also different from those of caryophyllene, especially its optical rotation. Nor does it appear to be identical with clovene, generated by Wallach from caryopoyllene hydrate. Wallach states that clovene is not capable of uniting with nitrosyl chloride, and it is, therefore, also incapable of uniting with the oxides of nitrogen. A comparison of the sesquiterpene generated from caryophyllene dihydrochloride with clovene and caryophyllene is given in the following table:

	Caryophyllene.	Sesquiterpene generated from caryophyllene dihydrochloride.	Clovene.
Sp. gr.	0.9039 (20°)	0.9191 (20°)	0.930 (18°)
Index of refraction	1.40976	1.49801	1.50066
Rotation	—8.96°	—35.39°	

Whether this sesquiterpene is an individual compound or a mixture of caryophyllene with another sesquiterpene cannot be stated.

---

[1] Pharm. Archives.

The indications are, however, that an inversion with the possible production of an isomer has taken place.

28. Sesquiterpenes of Cascarilla Oil.

In 1899 Thoms[1] reports on an oil of cascarilla investigated by Fendler, who found 10.5 p. c. of a sesquiterpene boiling at 255—257° and 33 p. c. of a sesquiterpene boiling at 260—265°, as well as 11 p. c. of an alcohol $C_{15}H_{23}GH$ boiling at 280—290°.

Fendler[2] himself makes a more detailed report. The lighter sesquiterpene is a light yellow oil of the following properties:

$d_{20°} = 0.911$; $[\alpha]_D = +23.49°$; b. p. 178—181°, (100 mm.), 255—257° (760 mm.).

Analysis shows the compound to contain some oxygen, but attempts to remove this failed. Attempts to prepare a hydrochloride, a bromide, and a nitrosite likewise failed.

The heavier sesquiterpene is a light yellow oil and is the principal constituent of the oil. It has the following properties:

B. p. 185—190° (100 mm.), 260—265 (760 mm.); $d_{20} = 0.924$; $[\alpha]_D = +7.36°$.

Analysis revealed the presence of oxygenated constituents also in this fraction. A molecular weight determination by the freezing point method, gave 195; calc. for $C_{15}H_{24} = 204$.

Concerning the sesquiterpenes Fendler remarks: "Diese völlig zu reinigen und zu charakterisieren resp. zu identifizieren, ist nach dem heutigen Stande der Kenntniss der Terpene noch unmöglich. Nach ihren Eigenschaften, welche von denen der bekannteren Sesquiterpene abweichen, ist anzunehmen, dass sie sich später vielleicht als neue, dem Cascarillöl eigentümliche Körper erweisen werden; möglicherweise sind sie auch mit einem oder dem anderen der zahllosen, teils benannten, teils unbenannten, aber noch wenig charakterisierten Sesquiterpene identisch."

29. Sesquiterpene of Celery Seed Oil.

In 1897 Ciamician and Silber[3] examined the distillation residue and the last runnings obtained in the preparation of celery seed oil. The ethereal solution of the oil was treated first with cold and then with hot alkali, which separated phenols and acids. The insoluble oil was found to amount to about 25 p. c. in the case of the distillation residue and 80 p. c. in the case of the last runnings. It boils for the greater part between 262 and 269°. A test for phenol esters gave a negative result and an analysis gave results that agreed with the formula $C_{15}H_{24}$. No solid hydrochloride could be obtained by treating with gaseous hydrochloric acid in ether solution. The sesquiterpene was not further investigated.

---

[1] Apoth. Ztg., 14, p. 562.
[2] Arch. d. Pharm., 238, 688.
[3] Ber., 10, p. 496.

29. Sesquiterpenes of Citronella Oil.

A very exhaustive investigation of citronella oil was made by the chemists of Schimmel & Co.[1] in 1899 by fractionating 100 kilos of oil by steam distillation. The 17th fraction (5 kilos of oil) consisted mainly of methyl eugenol and sesquiterpene, and a small amount of geraniol. The latter was removed by fractional distillation up to 146° under 18 mm. pressure. The residue was than shaken out with 60 p. c. alcohol. Methyl eugenol is soluble in 10 parts of 60 p. c. alcohol, whereas the sesquiterpene is but sparingly soluble in this mixture. This treatment was repeated eight times with 70 p. c. alcohol and the residue subjected to distillation under diminished pressure. In this way a fraction of nearly constant boiling point was obtained, which had the following properties:

B. p. 157° (15 mm.); $d_{15°} = 0.8643$; $\alpha_D = +1°28'$; $n_D = 1.5184$.

Under ordinary pressure the compound boils between 270—280° with much decomposition. An elementary analysis showed that some oxygen was still present, but its properties clearly showed the compound to be a sesquiterpene.

This sesquiterpene has the lowest specific gravity known of any member of this class of hydrocarbons. A calculation, based on the index of refraction, as to the number of double bonds present, indicates four double bouds. The compound appears, therefore, to be an olefinic sesquiterpene. The hydrocarbon corresponds in its properties to this supposition. It resinifies on standing for only a day, halogens and hydrohalogens produce immediate decomposition even in a freezing mixture: dilute permanganate solution yields only carbonic acid, oxalic acid and a glycol-like body, soluble in water. The hydration with acetic and sulphuric acids (0.1 p. c. of the latter) was very incomplete, the product of the reaction showing a saponification number of only 43.6.

---

[1] Ber. v. S. & Co., Oct. 1899, p. 12.

Although no characteristic derivatives of this sesquiterpene could be prepared, it is nevertheless quite certain that it is different from any of the known members of this group in its physical properties.

The 18th fraction (also 5 kilos) obtained in the fractionation of the oil by steam distillation was treated in the same way with 70 p. c. alcohol and the washed product distilled under diminished pressure. A second sesquiterpene leaving the following properties was thus obtained:

B. p. 272—275° (700 mm.), 170—172° (16 mm.); $d_{15°} = 0.712$; $\alpha_D = +5° 50'$.

On account of the slight difference in boiling point (about 8°) it was not possible to completely free the heavier sesquiterpene from the lighter compound, and the above specific gravity is, therefore, a little low. No chemical work on this heavier sesquiterpene is reported, and its identity with any of the known sesquiterpenes cannot be established by means of the data at hand.

30. Sesquiterpene of Copaiba Balsam Oil, African.

Umney[1] has examined the oil distilled from the so-called African copaiba balsam. The sp. gr. of the oil is 0.918 and it boils between 260—273°. Its rotation in a 200 mm. tube is +20° 42′. No crystalline hydrochloride could be obtained by passing dry hydrochloric acid gas into the oil, as has been stated to be the case by Soubeiran and Capitaine[2] with Maracaibo oil. Under similar treatment Umney has, however, also failed to get crystals of a hydrochloride from the Maracaibo variety, which result agrees in this respect with the experiments of Brix.[3]

The fraction boiling at 264° was subjected to the hydration method used by Wallach for identifying the sesquiterpene of ordinary capaiba balsam oil with caryophyllene.[4] Umney was unable to get a crystalline hydrate from the African variety, although fraction 260° of a South American copaiba oil yielded a small amount of a crystalline hydrate, identical with caryophyllene hydrate.

The failure to get a crystalline hydrate, also the rotatory power of the oil, seem to indicate the absence rather than the presence of caryophyllene The fact that this sesquiterpene has been identified in the American varieties, makes it highly desirable that this oil be subjected to the more modern tests. It is not improbable that we have here a dextrogyrate caryophyllene.

---

[1] Pharm. Journ., (3), 22, p. 450; 24, p. 215.
[2] Journ, Pharm., 26, p. 70.
[3] Monatshefte, 2, p. 507.
[4] See caryophyllene hydrate.

Literary.

Books Reviewed.

REPETITORIUM DER CHEMIE. Mit besonderer Berücksichtigung der für die Medicin wichtigen Verbindungen und zum Gebrauche für Mediciner und Pharmaceuten, bearbeitet von Dr. Carl Arnold, Professor der Chemie an der Thierärztlichen Hochschule in Hannover. Elfte verbesserte und ergänzte Auflage. Verlag von Leopold Voss, Hamburg und Leipzig. 1903.

The paramount value and usefulness of this book both for study and reference has been set forth in several reviews in former volumes of this journal (Vol. 3, p. 116—Vol. 9, p. 300—Vol. 11, p. 100 and Vol. 12, p. 223) and is best attested by the fact that since its first issue in 1884 ten more editions have been published. Every successive edition has been perfected so as to comply in general as well as in details with the progressive advance in chemical knowledge. As a mentor and for ready reference in chemical matters no similar compend is so well suited to practitioners of medicine and of pharmacy. *Fr. H.*

A TEXT-BOOK OF VOLUMETRIC ANALYSIS with special reference to the volumetric processes of the Pharmacopœia of the United States. Designed for the use of pharmacists and pharmaceutical students by Dr. Henry W. Schimpf. Fourth edition, revised and enlarged. One vol., pp. XXIX, 553, with sixty illustrations. John Wiley & Sons, New York. 1903.

A more extensive review of the third edition of this book will be found in an earlier volume of this journal.* While the criticisms, passed on the method of treatment, have also been pointed out by others; the conditions in pharmaceutical education, which justified such a book in 1899, have not changed materially. Hence. no doubt, the fourth edition will be welcome to those for whom it is intended, as were the earlier editions. These conditions, however, do not justify poor English, which, by no means, is absent. We trust, therefore, that this criticism may be obviated in a new edition.

While the rapid appearance of new editions demonstrates beyond dispute that the author has met "a long-felt want", it also speaks volums for the condition of pharmaceutical education in this country. The principle additions have been made to the chapters on the "Volumetric assaying of vegetable drugs" and on "Assay of galenical preparations." *E. K.*

---

* Vol. 17, p. 278.

GRUNDRISS EINER GESCHICHTE DER NATURWISSENSCHAFTEN. Zugleich eine Einführung in das Studium der grundlegenden naturwissenschaftlichen Litteratur. Von Dr. Friedrich Dannemann. II. Band: Die Entwicklung der Naturwissenschaften. Zweite, neu bearbeitete Auflage, pp. 450, mit 87 Abbildungen, zum grössten Theil in Wiedergabe nach den Originalwerken, einem Bildniss von Galilei und einer Spektraltafel. Verlag von Wilhelm Engelmann, Leipzig. 1903. M. 8.00.

To those who are impressed with the cultural value of the study of the history of the natural sciences, no event in recent years has been more promising than the rapid appearance of a second edition of Dannemann's "Grundriss". While the publication of works on special subjects and the reprints of the "Klassiker" have indicated that the physicist, the chemist, the biologist are realizing more and more the importance of the historic study of their respective sciences, the new edition of the "Grundriss" reveals the fact that the study of the history of the natural sciences as a whole is making progress. Because of the fundamental character of this work, its study will react favorably on the historic study of the several sciences as specialties. Moreover, the manner of presentation is such that the intelligent laity as well as the scientist may derive benefit from its study. To the person seeking a liberal education, the history of the natural sciences ought to equally important with the history of war. Viewed from the point of view of the evolution of civilization what factor in the world's history has been more potent than the quiet conquest of science? "Und sie bewegt sich doch" is forever sounding in our ears where ignorance and superstition are trying to block the progress of mankind by suppression of truth or by torture.

In as much as the "Grundriss" does not deal with modern hypotheses or controverted problems, but with the historic past, it lends itself to the use as a German science reader for those who are desirous of acquiring a reading knowledge of scientific German. As such it may well be recommended to the autodidact as well as to the college instructor. For this purpose it certainly is better adapted than many the brochures or articles on controverted subjects sometimee employed.

The usefulness of the "Grundriss" in several directions is so manifest that we can but give reexpression to the hope that the English language may soon possess a like book. The tendency, so manifest in our country, to put everything scientific to immediate practical use cannot be counteracted better than by the introduction of historic courses into our high schools and colleges. *E. K.*

FORMULAIRE DES MÉDICAMENTS NOUVEAUX POUR 1904, par H. Bocquillon-Limousin, docteur en pharmacie de l'Université de Paris. Introduction par le Dr Huchard, médecin des hôpitaux. 1 vol. in-18 de 322 pages, cartonné: 3 fr. Librairie J.-B. Baillière et fils, 19, rue Hautefeuille, Paris.

The year 1903 has witnessed the introduction of numerous new remedies, many of which find a place in this now well established annual.

Among the newly introduced synthetics are the methyl ester of acetsalicylic acid, atoxyl, bismutose, bromipine, bromoquinal, cacodylate of magnesium, citarine, collargol, eugenol iodide, guaiasanol, methylene glycolate, helmitol, iodipine, iodocacodylate of mercury, colloidal mercury, iodyloform, mesotane, phospho-mannitate of iron and many others. This annual, now in its sixteenth year, is so well established that it requires no new introduction each year. It's continuance speaks for itself. *E. K.*

COSMETICS. A handbook of the manufacture, employment, and testing of all cosmetic materials and cosmetic specialties. By Dr. Theodor Koller. Translated from the German by Chas. Salter. One vol., pp. VII, 262. D. Van Nostrand Company, New York. 1902. $2.50.

The preface to this volume so admirably reflects the general tone of the work, that it will serve better as an introduction than a review of its contents.

"The cosmetic industry is mainly indebted to the researches of chemists, who have first pointed out the right paths to follow, then introduced new and valuable substances to employ in the preservation of the hair and teeth, and also obviated certain injurious influences by the aid of antiseptics. Furthermore, dangerous substances have been replaced by innocuous substitutes; and, in a word, the technology of cosmetics has been undoubtedly elevated to the position of a branch of natural science.

"The manufacture of cosmetics is still, in many instances, suffering from too close adherence to ancient tradition, whereby entirely useless substances are accredited with healing powers; and even—which is far more serious—directly poisonous and injurious materials are employed, the use of which might entail great danger to health.

"In many quarters too little importance is still attached to the consideration of the first question that should arise in connection with any cosmetic, namely, whether the same contains any ingredients capable of acting beneficially in the cases for which it is designed, and without leading to injurious results on prolonged employment.

"Now it is only when this primary question has been put, and satisfactorily answered, that the rational stage of cosmetic technology is reached; and to answer this question it is necessary to have an accurate knowledge of the materials under consideration. This forms the basis of the present work, which is an endeavor to afford guidance and advice to the maker of cosmetic preparations; and to point out the best as well as the simplest methods of procedure. The fundamental principles to be followed in making up the various preparations are fully explained. Where the habits and whims of the public demand remedies where none exist, the question of how to satisfy this demand has received consideration, without, however, omitting to call attention to the inadequacy of the preparations themselves. All injurious ingredients have been strongly banned.

"It is highly desirable that the mystery of 'secret preparations' should be abandoned in cosmetics, and all endeavours concentrated on the attainment of perfection.

"Such a course would soon gain the confidence of the public, and would be of the greatest advantage to the cosmetic industry itself, which would then take up a position beside the sister industry of perfumery; and, within its proper limits, be just as useful as other branches of technology."

To this may be added the table of contents:

1. Purposes and uses of cosmetics, and ingredients used in their preparation.
2. Preparation of perfumes.
3. Chemical and animal products used in the manufacture of cosmetics.
4. Oils and fats used in the preparation of cosmetics.
5. General cosmetic preparations.
6. Mouth washes and tooth pastes.
7. Hair dyes, hair restorers, and depilatories.
8. Cosmetic adjuncts and specialties.
9. Antiseptic washes and soaps, toilet and hygienic soaps.
10. Cosmetic secret preparations for the skin, complexion, teeth, mouth, etc.
11. Testing and examining the materials employed in the manufacture of cosmetics.

The subject of cosmetics is so closely related to other hygienic subjects in which the pharmacist is of necessity interested, that this volume should find favor with the intelligent American pharmacist, to whom it is now available through this English translation.

E. K.

DETERMINATION OF RADICLES IN CARBON COMPOUNDS. By Dr. H. Meyer. Authorized translation by Dr, J. Bishop Tingle. Second edition rewritten. One vol., pp. XII, 162. John Wiley & Sons, New York. 1903. $1.00.

With the same welcome which we accorded the first appearance of this book we greet its second, revised edition. The writer, however, prefers the German title as more characteristic of the contents. The book is not a handbook, nor does it give detailed instructions in select special cases; it is primarily an introductory guide to the subject at large. The title of the original German edition, viz. "Guide to the quantitative determination of organic radicles," therefore seems more appropriate.

Every text book should be merely an aid to the overburdened teacher, not to take his place. As an aid to the teacher and as a guide to the student this second edition will, no doubt, continue to do good service for which it is intended. *E. K.*

You Can Do What He Did

THIOCOL ROCHE is a water-soluble, easily taken, effective form of guaiacol. It is likely to be in special demand during the colder months, as it is used in tuberculosis, pneumonia, chronic bronchitis, etc. It is marketed in four forms: Powder; 5-grn. Tablets; Sirolin (Syr. Thiocol Roche), 6 grn. to teaspoonful; and Syr. Thiocol Comp.

Last January a druggist of Cumberland, Maryland, wrote to us asking for 20 copies of Merck's Digest on Thiocol. His object was to distribute this printed matter among his local physicians. Recently he wrote for other literature, making this incidental statement: "With the literature on Thiocol that you sent me last winter, I succeeded in getting a very profitable demand for the article."

You Can Do What He Did

MERCK & CO.

UNIVERSITY PLACE,
NEW YORK.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street PHILADELPHIA
111 Fifth Avenue NEW YORK

— Die —

Deutsche Botanische Monatsschrift

beginnt demnächst ihren XX. Jahrgang. Sie kostet jährlich 6 Mark und sei allen Botanikern und Freunden der heimischen Flora bestens empfohlen.

Arnstadt, Thüringen.
Prof. Dr. G. Leimbach.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation

Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

Best eingeführter

...Kaufmann...

im Deutschen Reiche, sucht Vertretung in der **Apotheker- und Drogenbranche.**

Gefl. Offerten unter 508 postlagernd **Bromberg.**

Verlag von Herman Heyfelder — Berlin.

Chemisch-technisches Repertorium.

Uebersichtlicher Bericht über die **neuesten Erfindungen, Fortschritte u. Verbesserungen auf dem Gebiete der technischen und industriellen Chemie.**

Herausgegeben von **Dr. Emil Jacobsen.**

— 35. Jahrgang. —

Mit in den Text gedruckten Illustrationen. 1896

NEW EDITION

Webster's International Dictionary

25,000 NEW WORDS, ETC.

Prepared under the direct supervision of W.T. HARRIS, Ph.D., LL.D., United States Commissioner of Education, assisted by a large corps of competent specialists and editors.

New Plates Throughout. Rich Bindings.
2364 Pages. 5000 Illustrations.

Better Than Ever for Home, School, and Office.

Also **Webster's Collegiate Dictionary.**

Specimen pages, etc., of both books sent on application.

G. & C. Merriam Co., Springfield, Mass.

Chicago College of Pharmacy.

THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF ILLINOIS.

The forty-fourth session begins September 29th, 1903. The course comprises two terms of seven months each and leads to the degree of Graduate in Pharmacy. Write for the announcement to . . .

W. B. DAY, ACTUARY,
465 STATE ST., CHICAGO.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

SOME OF THE NEW BOOKS.

We present below a selection from the Fall books published or announced, including only those that promise to be the most important or the best sellers.

GIFT BOOKS.

Bar Sinister, The. By Richard Harding Davis. New illustrated edition. With 8 full-page drawings in color by E. M. Ashe. $1.50.

A pretty story of a dog, said to be drawn from life. Attracted attention when published in Scribner's, and sold well in ordinary book form.

Checked Love Affair, A. By Paul Leicescter Ford. Illustrated in color, with numerous pictures in photogravure, and decorated. $2.00.

A new story and probably the last by this author that will see the light.

Colonel Carter's Christmas. By F. Hopkinson Smith. With 8 full-page pictures in color by F. C. Yohn. $1.50

A new story about a favorite character in modern fiction.

Heart of Hyacinth, The. By Onoto Watanna. With marginal drawings in tint by a Japanese artist. Illustrated in color. Net $2.00.

A very attractive gift-book.

In Arcady. By Hamilton Wright Mabie. With 4 full-page illustrations by Will H. Low, and numerous decorations in color by Charles L. Hinton. .... Net $1.80

Mrs. Wiggs of the Cabbage Patch. By Alice Hegan Rice. Illustrated edition. With 24 illustrations, 12 in black and white, and 12 reproduced in color, by Florence Scovel Shinn. $2.00.

The ordinary edition (at $1.00) is still selling well, and there is no doubt that this style will be very popular for the holidays.

Weaker Sex, The. By Charles Dana Gibson. Net $4.20.

A new Gibson book is one of the events of the year, and always popular.

FICTION.

Adventures of Gerard, The. By A Canon Doyle. Illustrated. $1.50.

Gerard is an old friend, and his adventures are very entertaining.

Barlasch of the Guard. By Henry Seton Merriman. Illustrated by the Kinneys. $1.50.

Mr. Merriman is continuously popular, and his books always find a ready sale.

Castle of Twilight, The. By Margaret Horton Potter. Illustrated in tint by Ch. Weber. $1.50.

A serious and thoroughly interesting study of woman's life in feudal days. The fifth book of this remarkable young writer.

Cherry. By Booth Tarkington. Illustrated in color by A. I. Keller. With decorations. $1.25.

A charming story of old New York, in the bright style of "The Two Vanrevels."

Forest Hearth, The. By Charles Major. $1.50.

A story of Indiana in the 'thirties, by the writer who won so great a success with "When Knighthood was in Flower."

Fortunes of Fifi, The. By Molly Elliot Seawell. Illustrated in colors by T. de Thulstrup. $1.50.

A merry little comedy of the time of Napoleon, who plays a pleasant part therein.

Heart of Rome, The. By F. Marion Crawford. $1.50.

This promises to be one of the best of this favorite author's novels—dealing with the city he loves and knows so well.

Jewel. A Chapter in Her Life. By Clara Louise Burnham. Illustrated. $1.50.

A story by a popular writer showing the good accomplished by Christian Science, even through the medium of a child.

John Burt. By Frederick Upham Adams. Illus. $1.50.

A story that has attracted a great deal of attention while running as a serial.

Little Shepherd of Kingdom Come, The. By John Fox, Jr. Illustrated by F. C. Yohn. $1.50.

Probably destined to be the leading novel of the Fall. Like all of this writer's it is a Kentucky story and the most important he has yet written.

Long Night, The. By Stanley J. Weyman. Illustrated. $1.50.

A story of Geneva in the late Middle Ages, by a writer whose stories of adventures long ago have always sold well since the publication of "A Gentleman of France."

Mettle of the Pasture, The. By James Lane Allen. .... $1.50.

A story involving a question of conscience. The book has aroused a great deal of attention and discussion.

Over The Border. By Robert Barr. $1.50.

Mr. Barr has chosen the time of Cromwell for his new book, and it is safe to say that it will be interesting.

Rebecca, of Sunnybrook Farm. By Kate Douglas Wiggin. $1.25.

One of Mrs. Wiggin's entertaining stories, full of a delightful humor, and a fresh feeling for life and nature.

Sanctuary. By Edith Wharton. Illustrated by Walter Appleton Clark.. $1.50.

A strong and vivid story, treating of a psychological situation arising from a question of heredity.

Vagabond, The. By Frederick Palmer. Illustrated by Harrison Fisher. $1.50.

An interesting story of which the latter and longer part is concerned with the Civil War. It is well told and full of incident.

BIOGRAPHY AND HISTORY.

Cambridge Modern History. Planned by the late Lord Acton. Per vol., Net $4.00.

II. The Reformation. VII. The United States.

This is one of the most important historical works for several years. The volume on the United States, by both English and American writers, has proved of the greatest value.

Gladstone, The Life Of. By Rt. Hon. John Morley. Illustrated with portraits, facsimiles, and other pictures. 3 vols. Net $10.50.

The most notable book of the Fall, long announced and eagerly awaited. It is history as well as biography, by the best authority.

Old Quebec: The Fortress of New France. By Sir Gilbert Parker. With over 100 illustr. Net $3.50.

The author is a Canadian, and tells the story of the historical and romantic old town with the truth of history and the charm of fiction.

MISCELLANEOUS.

Five Nations, The. By Rudyard Kipling. Net $1.40.

The first colection of Mr. Kipling's poems since 1896. There are about twenty-five new poems, besides the most famous recent ones.

Forest, The. By Steward Edward White. Illustrated by Thomas Fogarty. Net $1.75.

No reader of "The Blazed Trail" needs to be told that Mr. White can write an intensely interesting book on forests and forest-life.

Glimpses of Truth. By Bishop J. L. Spalding. With new photogravure portrait. Net $0.80. Half calf or half morocco, gilt top. Net $2.00.

Some of Bishop Spalding's helpful philosophy in the form of aphorisms.

JUVENILE..

Crimson Fairy Book, The. By Andrew Lang. Illustrated in color and in black and white. Net $1.60.

Henty Books. Two new ones: Through Three Campaigns; With the Allies to Pekin. Illustrated. Per vol., Net $1.20.

Orchardland. By Robert W. Chambers. With 7 full-page illustrations in color and many marginal drawings by Reginald B. Birch. Net $1.50.

A companion to "Outdoorland," published last year.

Star Fairies, The, And Other Tales. By Edith Ogden Harlson. Illustrated in color by Lucy Fitch Perkins. Net $1.25.

A charming successor to "Prince Silverwings," by the wife of the mayor of Chicago.

Two Little Savages. By Ernest Thompson Seton. Profusely illustrated by the author. Net $1.75.

A book of woodcraft for boys, by the author of "Wild Animals I Have Known."

All books postage free, except those marked "Net," for which add 10 per cent for postage.
Discount allowed on all books not marked net.

We carry the most complete stock of

ENGLISH AND GERMAN BOOKS.

Scientific and technical Works, Periodicals & Newspapers
are furnished on short notice, or if not in stock will be procured without delay at moderate prices.

The Geo. Brumder Book-Department, Milwaukee, Wis.

Lanolin - Mercury

Represents a **PERFECTED** Mercurial Ointment. Its Lanolin base facilitates absorption and prevents rancidity.

ENCASED IN GELATINE CAPSULES, making it most handy for the patient, doctors will prefer this ointment for use in inunction cures to any other form.

Each gelatine capsule contains 3 grammes of the ointment, in either 33⅓% or 50% strength. By a tiny incision at the end of the capsule, its contents can be squeezed out and afterwards applied in the usual manner. The quantity to be administered can thus be definitely determined. If only for convenience and cleanliness alone,

Lanolin-Mercury Capsules

should be preferred to the ointment in bulk.

Lanolin-Mercury Capsules are supplied in boxes containing two dozen; either 33⅓% or 50% strength.

LEHN & FINK Manufacturing Chemists New York

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

"M. C. W." Morphine.

Our Morphine is unexcelled for purity, white and bulky. It may be had from all **Jobbers** at lowest prices and we invite our friends when ordering to

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.
Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 4. APRIL, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial 121
Damiana (The Mexican tea), Turnera aphrodisiaca. By *John Uri Lloyd* 126
The sesquiterpenes. A monograph by *Oswald Schreiner* 131
The proposed volatile oils of the U. S. P. 1900. By *E. Kremers* 146
An American pine tar oil. By *Edward Kremers* 149
The volatile oil from Monarda Citriodora. By *I. W. Brandel* 153
Pharmaceutical legislation in New York during the early seventies 155
Books reviewed 160

Throwing Money Away

No druggist likes to pour adrenal preparations into the sewer; but when they turn pink or brown it is all they are fit for.

It seems like throwing money away.

Physicians feel the same way about it.

To avoid this, buy Adnephrin Solution, which is **permanent** and, by actual physiological test, the **most active** preparation of the adrenal active principle on the market.

You lose nothing on Adnephrin Solution: **it keeps.**

You make more on it because, although in every respect the best, it costs you only

**60 cents
an ounce.**

Physicians like Adnephrin Solution better because it is more active than others, is non-irritating and retains its activity. Good reasons.

Order from your jobber or us.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for **Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.**

A. H WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.",
Oil Rose, artificial, "Schimmel & Co."

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

(Compound of stear-amide with hydrocarbons.)

**Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 20% water.**

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.

PASTEUR DRY ANTITOXIN

KEEPS INDEFINITELY

NO LOSS
NO DELAY
NO FAILURE
ONE SIZE
ONE STRENGTH
ONE DOSE
RIGHT PRICE

DON'T WAIT
UNTIL
DIPHTHERIA
PREVAILS

BUY NOW FROM
SHARP & DOHME
SOLE DEPOSITARIES
UNITED STATES OF AMERICA

No other Antitoxin is considered worthy of imitation

ACETONESULPHITE

RESTRAINER
Saves Over-Exposures
of any Degree.

SUBSTITUTE
for the
Sulphites.

PRESERVATIVE
Keeps Fixing Baths
Clear and Stable for Weeks.

EDINOL

Best All-Around Developer
for Plates, Paper, etc.
Never Fogs or Stains.

PHOTOGRAPHIC PRODUCTS
BAYER
40 Stone St. New York.
FARBENFABRIKEN ELBERFELD CO.

FLASHLIGHT

Practically no Smoke or Dust.
Safe. Efficient.
Strongest Actinity.

INTENSIFIER

Works in one Solution,
Which can be used Repeatedly;
Keeps Indefinitely.

FIXING SALT

A Rapid Working Acid Fixing Bath;
Clear and Effective
After Weeks of Use.

Selling Agents for the United States and Canada
FARBENFABRIKEN OF ELBERFELD CO., 40 Stone St., New York.

Trade also Supplied by

EDWARD H. BUEHLER,
134 Lake St., Chicago, Ill.

DOMINION DYEWOOD & CHEMICAL CO.,
Toronto, Ont., Canada.

OCCIDENTAL SUPPLY CO.,
131 Second St.,
San Francisco, Cal.

For Sale by All Dealers in Photographic Supplies and Wholesale Druggists.

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.
(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach. Pleasant in taste and readily assimilated.

★ ★ ★

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

DOSE FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

★ ★ ★

KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**

KEEP THESE IN STOCK

SOLUTION
ADRENALIN CHLORIDE
1:1000
A solution of the blood pressure raising principle of Suprarenal Gland.
Adrenalin chloride, 1 part
Normal sodium chloride solution (with 0.5% Chloretone). 1000 parts
PARKE, DAVIS & CO.
DETROIT, MICH. U.S.A.

SOLUTION
ADRENALIN CHLORIDE
WIDELY USED IN
SURGERY OF THE EYE,
EAR, NOSE, THROAT,
VAGINA AND URETHRA,
AND IN
PRACTICALLY EVERY FORM OF HEMORRHAGE ENCOUNTERED BY PHYSICIAN AND SURGEON.

IN OUNCE VIALS: PRICE, PER VIAL, NET, $0.85.

PARKE, DAVIS & CO.

ACETOZONE
One of the most remarkable Antiseptics ever brought to the attention of the medical profession.

USED EVERY DAY IN
TYPHOID FEVER, ABSCESS,
DIARRHEA, DYSENTERY,
GONORRHEA, TONSILLITIS,
AND MANY OTHER DISEASES AND CONDITIONS.

NET PRICES:
Per ounce bottle, $5.25; half-ounce, $2.70; quarter-ounce, $1.40.
Per box of 6 vials (15 grains in each vial), $1.25.

They are in Daily Demand by Physicians

Pharmaceutical Review.

VOLUME 22. APRIL, 1904. NUMBER 4.

Editorial.

During the senior year of his pharmacy course, the writer was one day approached by some of his classmates with reference to a medal which was annually awarded by the State Pharmaceutical Association to the graduate who was recommended by the Department as having attained the highest standings in course. The person who was openly aspiring for these honors evidently was not the choice of the class. In the course of the conversation, the writer informed his colleagues that while he greatly appreciated their good will he hoped that he might always find full satisfaction in his work for its own sake and not be in need of such a stimulus to do his duty toward himself and others.

It is possibly needless to state that the gold medal in question was not awarded to the writer. At the end of the academic year, however, he was informed of his appointment as laboratory assistant for the next collegiate year. This was a matter of importance for it proved to be the turning point in his career. Instead of returning to the drug store after graduation he began his preparation as teacher and investigator, for the duties of the position were such that they afforded ample time for research.

Inspired by an enthusiastic instructor who held that investigation and teaching should go hand in hand, one of the results of that memorable year's activity were two papers which were presented to the American Pharmaceutical Association at its Cincinnati meeting.

The connection between this autobiographic fragment and the **finances of the A. Ph. A.** are naturally not apparent to the reader, but will be shortly. More than a year after the Cincinnati meeting, the writer, then engaged in study in Europe, received the information that his two papers had been awarded the Ebert Prize.

In as much as the prize had been awarded but four times in the course of thirteen years, the news was very gratifying indeed. The money value of the prize was about the same as that of the gold medal which he had escaped a few years before. Whereas the gold medal would have been useless or even worse, the award of the Ebert Prize served as a further stimulus and the money was spent in the purchase of books which otherwise would not have been acquired.

Again the question may be asked what all of this has to do with the finances of the A. Ph. A. It merely serves to show in a specific instance how a comparatively small fund well managed by the Association may be productive of good results in encouraging pharmaceutical research, for there can be but little doubt that the Ebert Prize has done more than any one thing to encourage the pharmaceutical investigator in this country.

As the fund has been administered, the Ebert Prize has become to be regarded by many as one of the highest gifts which the Association can bestow. Other prizes have greater money value, and the offices of the Association appear to be within the reach of any one who is persistent enough in striving after them, but the Ebert Prize as a rule does not come to the one who strives after it, but is awarded to the one who has faithfully performed a good piece of scientific research without thought of glory but with a love for scientific truth for its own sake.

It seems worth while, therefore, to look backward in order to obtain a better idea of the motives that lead to the establishment of this fund and of its administration.

At the last session of the Richmond meeting in 1873, Mr. Albert E. Ebert, who had been elected President at Cleveland presented the following communication to the Association:*

GENTLEMEN: — To further original investigation and to inaugurate a system of prizes by this association, to those who, by study and application, shall add to our knowledge of medicinal substances, I have the pleasure to present to this Association the inclosed sum, five hundred dollars, to be used in the following manner: the money to be properly invested by order of the Executive Committee, and the annual interest derived therefrom, to be appropriated for conferring a suitable prize for the best essay, or written contribution, containing an original investigation of a medicinal substance, determining new properties, or containing other meritorious contributions to knowledge, or for improved methods, of determined merit, for the preparation of chemical and pharmacal products. The prize to be awarded by a suitable committee, within six months after the annual meeting at which the essays are presented for competition; provided, that in case no one of the essays offered is of sufficient merit to justify the award, in the judgement of the committee, all may be rejected, and the sum added to that of the fund.

---

* Proc. A Ph. A., 21, p. 58.

Respectfully, ALBERT E. EBERT.

As the last act of a retiring President, this certainly was gracefully done. It was Dr. Squibb who rose to move that "this offer be accepted in the kind spirit in which it is made to us as an Association, that it be heartily accepted, and the object of the donor be carried out by a committee."

In the accompanying tabulation will be found a financial account of the Ebert Fund and its growth is so far as data are obtainable

Financial Development of the Ebert Fund.

Year.	Page of Proc.	Amount invested.		Cash in bank.	Interest and dividends	Paid out.		Status of fund at time of report.	
		Face value.	Estimated value.			For prize.	For additional bonds.	Face value.	Estim'd value.
1878	58							500	
4	496								
5									
6	598								
7									
8					30.00*				
9	778				60.07				
1880	524				49.82				
1	513								
2	608								
3	436						128.00		682.43
4	524				20.50				692.26
5	548		613.10	116.45					729.55
6	149	600	757.50	14.63					772.13
7	461	600	769.50	32.96	18.33				802.46
8	28	600	762	34.00					796.00
9	19		777	34.78	24.00	24.00			811.76
1890	19		729	35.98	24.00	24.00			764.98
1	22		729	30.82	24.00	24.00			759.82
2	26		699	62.55					761.55
3	55	600	660	64.18					724.18
4	13	600	660	90.11					750.11
5	17	600	660	117.47					777.47
6	47	700		117.47	29.65		117.00	730.12	
7	82	700		30.12	29.07			759.19	
8	94	700		59.19	29.54	28.00		760.73	
9	124	700		60.73	29.47	28.00		762.20	
1900	74	700		62.20	27.84	28.00		762.04	
1	98	700		62.04	31.28	28.00		765.82	
2	651	700		65.32	29.75			795.07	

* Correction. Proc. A. Ph. A., 1879, p. 779.

Readers who discover errors in the above table will kindly point them out. Additional information will also be gladly received.

from the printed Proceedings. A mere glance reveals the fact that from 1887 on the data provided are much more satisfactory. This appears to be partly due to the change in the office of Treasurer, in part to the fact that the permanent funds were placed under the direct charge of the Chairman of the Council. The laxity in financial matters as revealed by the Treasurer's reports before this date is in striking contrast to the care which has ever since been bestowed upon these reports.

Thus e. g. the report of the Treasurer in 1882* contains the following statement: "In addition the Association has the Ebert Fund, $500." Within the first ten years no one seems to have cared much in what condition this fund was. From the last report of the former Treasurer the followfng sentence may be quoted: "This does not include the invested funds of the Association, amounting to $3765.94." *

Fortunately for the fund, the Ebert Prize was not awarded very often in the early years. As a result another $100 bond could be added in 1883 and a second one in 1896, so that the fund now consists of $700 (face value) in bonds plus the cash in the bank. With the exercise of a little discretion in the awarding of the Ebert Prize, it ought to be possible soon to increase this fund to $800 face value.

The writer fully realizes that the object of the founder was to stimulate research and the presentation of valuable papers to the American Pharmaceutical Association. To what extent his hopes have been realized, he alone can state. The accompanying list of awards may give the reader a better idea of the kind of papers that have been regarded as worthy of award by the various committees of the Association.

This list reveals the fact that whatever may have been the original attitude of the founder and of the Association, the award of the Ebert Prize has come to stand for a somewhat substantial contribution to scientific knowledge, No doubt, mistakes have been made in the past and will continue to be made in the future. With such a precedent, however, the Ebert Prize must continue to be one of the principal awards of the American Pharmaceutical Association. Loug after the present veterans of the A. Ph. A. will have passed away, the memory of Mr. Albert E. Ebert will ever remain fresh so long as the American Pharmaceutical Association continues its useful work in the elevation of American pharmacy. Let us hope that others may emulate the example of Mr. Ebert and endow funds for research of which we are co sadly in need.

---

* Proceedings, p. 608.
** Proceedings, 1886, p. 149.

Awards of the Ebert Prize.

Year.	Name of Author.	Title of Paper.	Page of publication.
1874	Chas. L. Mitchell.	The active principles of the officinal veratrums.	397
1877	Fred. B. Power.	On the resin of the rhizome of Podophyllum peltatum.	420
1882	John U. Lloyd.	Precipitates in fluid extracts.	508
1886	Emlen Painter.	Spirit of nitrous ether.	61
1887	Edward Kremers.	1) Analysis of the volatile oil of Hedeoma pulegioides. 2) Chemical examination of the oil of Andropogon nardus.	546 562
1888	Jos. F. Geisler.	Notes on the morphiometric assay of opium.	149
1889	Wm. T. Wenzell.	A contribution to the knowledge of the coloring principle of flowers.	244
1891	John U. Lloyd.	Remarks concerning as scheme to establish a comparative standard for alkaloidal galenicals.	124
1896	Albert B. Precott & Jas. W. T. Knox.	The caffein compound in kola.	136
1897	Virgil Coblentz.	Gelsemic acid.	225
1898	Henry Kraemer	Quantitative examination of powdered crude drugs.	295
1899	Edward Kremers & Oswald Schreiner.	Nitroso derivatives of caryophyllene and cadinene and their bearing on the characterization and classification of the sesquiterpenes.	158
1902	J. O. Schlotterbeck & H. C. Watkins.	The alkaloids of Adlumia cirrhosa.	332

DAMIANA (The Mexican Tea), Turnera aphrodisiaca.

By *John Uri Lloyd.*

About thirty years ago, Dr. F. O. St. Clair of Washington, D. C., introduced Damiana to the medical profession of the United States. The botanical name was not known to Dr. St. Clair, but was afterward determined as *Turnera aphrodisiaca.* It became my duty, in 1881, to describe the drug and its (then) sophisticant (*Aplopappus discoideus*), for the American Dispensatory, the article being published in advance by Dr. Charles Rice, editor of the American Druggist. I now find myself in the home of Damiana, and am enabled to supplement that paper, as well as, I believe, correct certain generally accepted popular American errors concerning the drug. La Paz. Lower California (Ba ja California), is the principal Damiana port of export, and information obtained on the ground may be considered authentic.

The Name. Damiana is the Mexican name of the plant which yields the leaf sold under the name. So far as I can discover, this name has no significance. Possibly, in days gone by, the term might have possessed a specific meaning, but more likely it is an heirloom of the Indians that inhabited the Peninsula before the Spanish invasion. Be that as it may, the term Damiana is familiar to every Mexican, but concerning the meaning and derivation of the word, all concur in that it is simply the name of the plant.

The Plant. The leaf of Damiana is now too familiar a drug to necessitate detailed description, the fragrant, olive-green leaf being well known to pharmacists. The plant is a low shrub, the bushy head of which is prone upon the ground, from which descends the gnarled, often twisted root stem, and spring the coarse twigs. This root is tough, hard, the central part (about one third) being brown, the remainder yellow. The main root stalk averages an inch or more in diameter, from which project tough side roots the size of a lead pencil, gray externally, but yellow within. From extreme to extreme, a damiana plant may average two to four feet, root measurement, but is less in depth. The tough stems make a scraggly bush, two to three feet high. In the dry season, which includes most of the year, the tough, brittle root seems to be nearly devoid of moisture. It may even be seemingly as dry as the dust about it, as is true of the specimens now before me, but I am told that this sapless specimen of vegetation, gray and forlorn as is the hot dry sand and soil about it, on the first touch of rain, will put forth a mass of foliage, and with wonderful activity will become a living bush, which, when the few days of rain are over, dries again in the sand, and slumbers through the long season of heat and dust. Cattle and other animals are fond of Damiana, and it is asserted that a peculiar, sweet flavor is imparted to the flesh of such creatures during the Damiana season.

Damiana, I am told, is practically confined to the lower part of the Peninsula of Lower California, from which, mainly from the port of La Paz, it is exported, the larger amount now going to the United States. Its habitat, even here, is in the foot hills inland, the main supply coming from forty miles west of La Paz, thence being abundant towards the town of Todos Santos, on the Pacific shore. It grows in patches or clumps, with spaces, sometimes of considerable size, between the bunches. It is gathered by the country people, and for exportation is packed in bales of convenient size, coarse coffee sacks being usually employed. I find in local use, small square bales in calico casing, each holding two litres, but it is generally retailed loose by grocers, as tea is sold in America. The difference in the quality of Damiana is very great, owing both to care in curing, and to its condition when gathered, as well as to its age, for by age it loses much of its aroma and fragrance. The Mexican is particular concerning this latter point, and highly values a freshness in quality. It should be nearly devoid of stems, of a lively, olive-green color, a grateful, delightful fragrance, and should impart an aromatic, slightly astringent taste when chewed. As found in commerce, the small leaf is much broken. When gathered in the flowering season, it is in very best condition, and is most highly valued by Mexicans when the flowers are present. They prize the flavor in this mixture of leaf and blossom.

Sophisticants. (Ash Damiana.) The only plant that is here confused with Damiana is a related shrub of similar appearance and growth. Its leaf resembles Damiana in contour, and is possessed of a similar odor and taste. It differs in general in that it has a more grayish (ash) color (due to a coat of silky down), and a more wooly touch and appearance, lacking the lively, olive-green color of the true, crisp leaf. This plant is not only downy to the touch, but the leaf, leaf-stem, and buds are also pubescent, the leaf being thick and leathery, as contrasted with the brittle, thin leaf of true Damiana. This species is found abundantly within twenty miles of La Paz, while the true species is not abundant east of the foot hills that center the peninsula. This ash species is not used by the Mexicans, and yet, by one inexperienced, it might readily be taken for Damiana. I have discovered that the leaf of this plant has been largely sent to the United States, the gentleman giving me this information calling it "Bastard Damiana." Although it should be considered a sophisticant, its sensible properties so nearly resemble Damiana as to indicate that pharmaceutical preparations can not be readily differentiated.*

Damiana Root and Shrub. I am reliably informed that an attempt is being made to put the root and shrub on the market as a drug substitute for the leaf. Owing to its weight it will be a cheap sophisticant, and may serve the purpose of a cheap substitute. But I cannot discover any of the qualities of Damiana in either the root or shrub. The final result of such procedure (owing to the restricted locality in which damiana grows), will be to exterminate the plant, and increase the price of Damiana. The Mexican Government should at once take steps to prohibit the exportation of Damiana root, and thus preserve the industry, and protect this important Mexican tea.

Mexican Uses of Damiana. Damiana is the native Mexican tea, and is used exactly as tea is employed in the United States. Although its use is now largely confined to the poorer classes, it is a favorite beverage throughout the Peninsula, and also, I am reliably informed, elsewhere throughout Mexico, although this latter statement I have not personally verified. It may be likened in this respect to our domestic Sassafras, which is yet used as a beverage, in a limited way, in rural districts, in many sections of the United States. Damiana is consumed in Mexico as a stimulating beverage, and is not used as a drug, although its qualities are both soothing and stimulating. That it may have, occasionally, an aphrodisiac property, in Mexican view, is evident from the fact that in one case a Mexican who met Americans often, ascribed to it that character. But I find, after patient and particular investigation in the Mexican home of Damiana, that it is universally served as tea, to men, women, and children alike. I am therefore inclined to believe that a Mexican statement concerning its aphrodisiac qualities is a reflex touch from American advertisements, or American statements. Its repute here is that of a pleasant, gentle stimulant, and it is also employed as a hot drink when the menses are suppressed. It is also used in colic, the statement being that a strong, hot tea of Damiana will bring quick relief. This statement I have also verified from a heavy native exporter of the drug. The fact that Damiana tea is used so extensively, demonstrates that it is harmless, while its employment for persons of both sexes and of all ages indicates that it is not considered a drug exclusively for purposes such as are asserted to be its reputed qualities in American medicine. I am therefore inclined to accept without reserve that the reputed qualities of this drug, as accepted in America, are not based on its Mexican use or reputation.

---

* I have taken steps to obtain the different species of shrub, and when their botanical names are determined will supply this deficiency. A dealer in Damiana assures me that another "Bastard" species exists, intermediate between those I have described.

Damiana is a fragrant, slightly astringent, gentle stimulant or tonic, which in its habitat serves a useful purpose. Its long continued use is not followed by nervousness, as is the case with tea and coffee drinking. I made careful and exhaustive inquiries to ascertain if any ill effect followed its habitual use, and found none whatever. On asking for a cup of Damiana tea at the hotel where this article is written, it was served me without comment, the proprietor stating that he kept the leaf constantly on hand, and considered it a harmless beverage, adding that some people drink it exclusively. I found it not unpleasant to the palate.

And now the question may be asked, is it possible that so many American physicians who have prescribed Damiana have erred in their opinion of the drug? In reply it may be stated that it is not unlikely that, in some instances, a gentle, aromatic stimulant like Damiana may accomplish aphrodisiac effects. In my opinion, however, the shot-gun method of prescribing Damiana has maintained for this innocent drug its chief reputation in a field where error originally placed it. As a rule, Damiana is associated in prescriptions with Phosphorus, Nux Vomica, Strychnine, Iron compounds, and such powerful agents as these, where its gentle companionship is dominated by its powerful associates. Or, the name "Damiana" is used as a trade mark term for proprietary preparations in which the other ingredients are concealed. Few physicians employ it alone, and such therapeutical authorities as I know to have investigated it in a pure condition, assert its inefficiency as an aphrodisiac. Like the harmless Spreading Viper, to which a general public has erroneously ascribed most virulent attributes, but which is almost helpless and is perfectly innocuous, so Damiana has been broadly heralded as a remedy in a field where its innocent qualities forbid it a conspicuous place.

Resumé. Damiana is a Mexican shrub, its habitat being on the peninsula of Lower California, inland from La Paz. It was introduced to American medicine under a misunderstanding of its nature. It is not a Mexican drug, but a general beverage. Its qualities reside in a fragrant leaf, yielding to hot water a pleasant, harmless, tea-like beverage which, so far as history determines, has been consumed from all time by the Mexicans, and is still so employed by all classes, men, women and children alike.* It is a gentle stimulant or tonic, kindly in action, pleasant to the taste, and acceptable to the stomach. Its medicinal qualities are mainly restricted, in Mexico, to cases where a gentle stimulant may be effectual, as in suppressed menses, in which it is desirable to administer a hot drink in connection with a grateful aromotic that will not disturb the stomach. In other words, Damiana is a homely, domestic remedy, innocent of the attributes under which, in American medicine, it has, for a quarter of a century, been forced to masquerade. Its American field is now restricted, but in its true position the use of Damiana may be broadened. A freshly made tea of prime, recent Damiana herb, when it can be procured, is perhaps the most desirable form of administration, or a concentrated cordial representatitive of the drug, of exceptional freshness and of prime quality, palatable as possible, made to carry the full qualities of Damiana.

La Paz, Mexico, February 10th, 1904.

---

* I have met the very best in society, who drink Damiana tea through choice. The poorer classes use it almost exclusively.

The Sesquiterpenes.*

A monograph by *Oswald Schreiner.*

31. Sesquiterpene of Cubeb Oil.

According to Oglialoro[1] and also Schmidt,[2] oil of cubebs contains, besides cadinene, a sesquiterpene of lower boiling point (262—263°) and lower rotatory power, which does not combine with hydrochloric acid. For discussion see cadinene in cubeb oil.

32. Sesquiterpene of Cypress Oil.

According to Schimmel & Co.[3] the oil from the leaves and twigs contains pinene, and "probably sylvestrene and a sesquiterpene." No data whatever are given.

Cypress camphor. From the last running of the oil distilled from the leaves and young branches of *Cupressus sempervirens* a crystalline substance occasionally separates.[4] This "cypress camphor" is probably a sesquiterpene hydrate, as it resembles cedar camphor or cedrol, from which it differs, however, by being optically inactive. It may possibly be the optically inactive modification of cedrol. From alcohol the compound crystallizes in fine needles, from petroleum ether in compact crystalline masses.

33. Sesquiterpene of Erechthites Oil.

Beilstein and Wiegand[5] found fraction 240—310° of erechthites oil, after distillation from sodium, to correspond to the composition C_5H_8. The high boiling point would seem to indicate a sesquiterpene.

Power[6] found the oil to give Wallach's color reaction for cadinene.

34. Sesquiterpene of Garlic Oil.

Beckett and Wright[7] found in garlic oil a sesquiterpene, $C_{15}H_{24}$, boiling at 253.9° but Semmler[8] did not find this compound in the crude oil examined by him.

---

* Continued from Pharm. Review, Vol. 22, p. 60.

[1] Ber., 8, p. 1357.

[2] Arch. d. Pharm., 191, p. 22.

[3] Ber. v. S. & Co., Oct. 1894, p. 71.

[4] G.-H.-K., The volatile oils, p. 269.

[5] Ber., 15, p. 2852.

[6] Pharm. Rundschau, 5, p. 202.

[7] Jahresb. f. Chem., 1876, p. 398.

[8] Arch. d. Pharm., 230, p. 441.

35. Sesquiterpene of Hemlock Needle Oil.

Bertram and Walbaum[1] report the presence of a sesquiterpene in oil of hemlock, but do not identify it.

Schimmel & Co.[2] in 1893 mention cadinene as a constituent of this oil, without, however, giving any proof or reference. The same is done by Heusler.[3] Gildemeister & Hoffmann[4] still mention the sesquiterpene as undetermined.

36. Sesquiterpene of Hemp Oil.

Personne[5] in 1857 isolated two hydrocarbons from the oil of hemp. These had the formulas $C_{12}H_{14}$ (?) and $C_{18}H_{20}$. The latter hydrocarbon he called *cannabene*. The work of Valenta and also of Vignola show cannabene to have been an impure sesquiterpene.

Valenta[6] in 1880 investigated an oil distilled from Italian hemp. The oil consisted principally of a sesquiterpene which had the following properties:

B. p. 256—258°; $d_{0°} = 0.9289$; $[\alpha]_D = -10.81°$.

With hydrochloric acid it formed a solid derivative.[7] The oil from the male infloresecence of *Cannabis gigantea* is said to contain the same sesquiterpene.

The oil of hemp distilled by Vignolo[8] in 1895 boiled between 248 and 268°. By repeated treatment with sodium, he obtained an oil boiling at 256°. Its sp. gr. was 0.897 at 15.3° and showed a slight rotation to the left in a chloroform solution. The compound was identified as $C_{15}H_{24}$ by analysis and vapor density. With bromine it yields a solid compound, but evidently undergoes decomposition as hydrobromic acid is given off. With hydrochloric acid it yielded no solid hydrochloride.

Wood, Spivey and Easterfield[9] in 1896 examined the resin of Indian hemp. From the oil they separated a sesquiterpene, which after treatment with sodium had the following properties:

B. p. 258—259°; $d_{18°} = 0.898$; $[\alpha]_D = -8.6°$.

---

[1] Arch. d. Pharm., 231, p. 295.
[2] Ber. v. S. & Co., Oct. 1893, Suppl. p. 21.
[3] Die Terpene, p. 168.
[4] G.-H.-K., The volatile oils, p. 264.
[5] Journ. de Pharm., 31, p. 48.
[6] Gazz. chim., 10, p. 479; 11, p. 191; Ber. 13, p. 2431; 14, p. 1717.
[7] G.-H.-K., The volatile oils, p. 338.
[8] Gazz. chim., 25, I, p. 110; Ber., 27, Ref. p. 406; Ber. v. S. & Co., Oct. 1895, p. 57.
[9] Journ. Chem. Soc., 69, p. 539.

This sesquiterpene absorbed hydrochloric acid and bromine but no crystalline derivatives were obtained.

The properties of the sesquiterpene of hemp oil agree best with those of impure caryophyllene.

37. Sesquiterpene of Kampferia Galanga Oil.

Van Romburgh obtained from the oil of *Kampferia galanga* a bluish green fraction boiling at 150° in a vacuum which probably consists of a sesquiterpene.[1]

38. Sesquiterpene of Kesso Root Oil.

Bertram and Gildemeister[2] obtained from oil of kesso root a fraction which boiled between 260 and 280°. It is described as a colorless liquid having a decided sesquiterpene odor. Attempts to prepare a hydrochloride failed. The highest boiling portions consisted of a blue oil.

39. Sesquiterpene of Laurel Berry Oil.

Blas[3] isolated from the oil of laurel berries by treatment with solution of caustic potassa a hydrocarbon which, after distillation from sodium in an atmosphere of hydrogen, had the following properties:

$$\text{B. p. } 250°;\ d_{15°} = 0.925;\ \alpha_D = -7.23°.$$

Analysis agreed with the formula $C_{15}H_{24}$. Blas points out that the rotatory power agrees best with that of the hydrocarbon from oil of rhodium, which Gladstone determined as —11°.

The physical constants of this hydrocarbon appear to agree best with those of caryophyllene as shown by the following tabulation of constants:

	B. p.	Sp. gr.	α_D
Caryophyllene .... (Schreiner & Kremers)	136—137° (20 mm.)	0.9030 (20°)	—8.09°
Sesquiterpene	250°	0.925	—7.23°
Caryophyllene .... (Wallach)	258—260°	0.9085	active

The question might readily be decided by means of the nitrosite reaction for this hydrocarbon, if some of the oil could be obtained.

---

[1] Ber. v. S. & Co., Oct. 1900, p. 38.

[1] Arch. d. Pharm., 228, p. 486.

[1] Ann., 184, p. 1.

40. Sesquiterpene of Lavender Oil.

Semmler & Tiemann[1] obtained a small amount of a sesquiterpene boiling at 130° under 15 mm. pressure from English lavender oil. No other properties are given.

41. Sesquiterpene of Lemon Oil.

According to Oliveri[2] the high boiling fractions of lemon oil contain a sesquiterpene, having the following properties:

B. p. 240—242°; $d_0^\circ = 0.9847$.

The tetrabromide and dihydrochloride of this body are liquids.

42. Sesquiterpene of Linaloe Oil.

Barbier and Bouveault[3] obtained from the saponified Mexican linaloe oil, after repeated distillation under a pressure of 10 mm. a fraction boiling between 130 and 140°. By treatment with sodium and rectification in a vacuum they isolated a hydrocarbon boiling at 135—136° (10 mm.) and corresponding to the formula $C_{15}H_{24}$ as was shown by analysis and molecular weight determination. The sesquiterpene absorbs four atoms of bromine and contains, therefore, two double bonds.

The quantity of hydrocarbon found in the oil is about 3 p. c. although the authors state that the amount is variable as another sample from an equally authentic source, contained very little of this hydrocarbon. The almost total absence of physical constants and chemical work is to be regretted.

43. Sesquiterpene of Long Pepper Oil.

The oil of long pepper was distilled by Schimmel & Co.[4] in 1890. It is described as having a mild taste and an odor reminding of ginger. It boils between 250—300° and has a specific gravity of 0.861 at 15°.

The high boiling point and low specific gravity would seem to indicate a hydrocarbon of the sesquiterpene series. The data given are insufficient for making a comparison with the properties of zingiberene, but it doubtless belongs to the same class of the sesquiterpenes as the latter.

---

[1] Ber., 25, p. 1187.
[2] Gazz. chim., 21. p. 318; Ber., 24, Ref. p. 624.
[3] Compt. rend., 121, p. 168.
[4] Ber. v. S. & Co., 1890, p. 48.

44. Sesquiterpene of Minjak-Lagam Balsam Oil.

Minjak-Lagam balsam is closely allied to gurjun balsam and it is not improbable that the sesquiterpene from this oil is identical with the sesquiterpene from gurjun balsam oil (see Gurjunene).

Haussner[1] in 1883 examined the volatile oil distilled from the balsam with water vapor. The oil was separated, dried and distilled in an atmosphere of carbon dioxide. It had the following properties:

B. p. 249—251°; $d_{15^\circ} = 0.923$; $a_D = -9.9^\circ$.

The oil corresponded to the composition $C_{15}H_{24}$, although Haussner gives the formula $C_{20}H_{32}$, based on a vapor density determination by Hoffmann's method, which, no doubt, gives too high a result at the temperature of boiling diphenylene, viz. 290°. Exposed to air it readily resinifies.

Trihydrochloride. Haussner succeeded in preparing a trihydrochloride of this sesquiterpene by passing dry hydrochloric acid gas directly into the oil contained in U-tubes kept cold by a freezing mixture. The oil became dark violet and very viscous. After standing for some time in the freezing mixture, the heavy oil was found to be interspersed with crystals. These were separated by pressing on filter paper. The oil absorbed by the paper was taken up with alcohol, and after evaporating the solvent it was again treated with hydrochloric acid gas. A second crop of crystals was thus obtained. The crystals were purified by several crystallizations from alcohol. The analysis agreed with the formula $C_{15}H_{24}.3HCl$ or $C_{20}H_{32}4HCl$ as Haussner considers it.

The trihydrochloride is soluble in alcohol, ether, benzol, and carbon disulphide. From cold alcohol it separates in long (3 cm.) white needles, melting at 114°. From hot alcohol it separates in felt-like crystals.

The formation of this trihydrochloride is rather suprising, as it would indicate the presence of three double bonds in the sesquiterpene. For this, its specific gravity is, however, rather high. It is to be regretted that the index of refraction was not determined so that the the number of double bonds might have been calculated from this physicial constant.

Beyond the preparation of the trihydrochloride Haussner obtained no positive results, although he tried the action of the hologens on the oil.

---

[1] Arch. d. Pharm., 221, p. 245.

45. Sesquiterpene of Peppermint Oil, English.

Flückiger and Power[1] separated from dementholized Mitcham oil of peppermint, a fraction which after repeated rectification over metallic sodium had the following properties:

B. p. 255—260°; $d_{21°} = 0.912$; $\alpha_D = +9° 2'$.

Analysis agreed fairly well with the formula $C_{15}H_{24}$. Although the oil was dextrogyrate it is possible that it is identical with the cadinene found in the American oil by Schimmel & Co.[2]

46. Sesquiterpene of Peppermint Oil, Japanese.

Beckett and Wright[3] examined Japanese oil of peppermint and, after separating the menthol, they obtained a fraction boiling at 245—255°. This they supposed to be a compound $C_{30}H_{50}O$ formed by splitting off two molecules of water from three mol. of the compound $C_{10}H_{18}O$ (menthone?)

$$3C_{10}H_{18}O = C_{30}H_{50}O + 2H_2O.$$

It is more probable that the fraction consisted of a sesquiterpene (found in both English and American oils) mixed with an oxygenated constituent.

47. Sesquiterpene of Pimenta Oil.

In 1864, Oeser[4] investigated pimenta oil. He dissolved the oil in caustic potash and then treated it with water. On heating slightly, an indifferent oily layer separated. This oil, after having been dried and rectified, had the following properties:

B. p. 255°; $d_{8°} = 0.98$; $[\alpha]_j = -0.49°$.

Analysis showed it to have the formula $(C_5H_8)x$ and on account of its high boiling point Oeser gave it the formula $C_{15}H_{24}$. Oeser further thinks that it is identical with the hydrocarbon found by Williams[5] and earlier by Brüning[6] and by Ettling[7] in oil of cloves. This however appears not to be the case, as the specific gravity of the hydrocarbon from cloves. now known as caryophyllene, is much less than that of the hydrocarbon from pimenta oil. A more thorough investigation of this hydrocarbon would doubtless prove interesting.

---

[1] Pharm. Journ., (2). 11. p. 22; Arch. d. Pharm., 218, p. 222.
[2] Ber. v. S. & Co., Apr. 1894, p. 42.
[3] Journ. Chem. Soc., 1876, I, p. 8.
[4] Ann., 131, p. 277.
[5] Ann., 107, p. 242.
[6] Ann., 104, p. 202.
[7] Ann., 9, p. 68.

48. Sesquiterpene of Poplar Bud Oil.

Fichter and Katz[1] in 1899 found the sesquiterpene fraction of poplar bud oil to consist chiefly of humulene, but as the yield of humulene derivatives was smaller than obtained from the sesquiterpene of hop oil, and also because their fraction was optically active, whereas the humulene of Chapman[2] is inactive, they conclude that another sesquiterpene accompanies the humulene in oil of poplar buds. See under humulene.

49. Sesquiterpene of (English) Sage Oil.

Sugiura and Muir[3] in 1878 report on the examination of a small sample of "absolutely pure sage oil" (English). It consisted for the most part of a sesquiterpene having the following properties:

B. p. 264—270°; $d_0° = 0.9198$, $d_{24°} = 0.9072$; $\alpha_D = +3° 14'$.

It had a dark emerald green color and did not form a stable hydrochloride.

In 1880 Muir[4] confirms his previous work and states that large quantities of cedrene are present in English sage oil distilled from the leaves. This time he gives the boiling point as 260°.

Although Muir calls the sesquiterpene cedrene, it is quite different in its properties from the cedrene obtained from cedarwood oil. There can be but little doubt that Muir used the name cedrene in the sense suggested by Beckett and Wright[5] in 1876, who applied the designation "cedrenes" to all hydrocarbons of the formula $C_{15}H_{24}$.

50. Sesquiterpene from Santonin and Santonin Derivatives.

Cannizzaro and Amato[6] in 1874 found that when santonic acid, $C_{15}H_{20}O_4$ is treated with hydriodic acid, there results a hydrocarbon, $C_{15}H_{26}$ and an iodide $C_{15}H_{25}I$. This iodide boils at 143—145° under 5 mm. pressure. Distilled at ordinary pressure, it decomposes largely into hydriodic acid and a sesquiterpene, $C_{15}H_{24}$.

According to Andreocci[7] a liquid hydrocarbon of the formula $C_{15}H_{24}$ (or $C_{14}H_{22}$) boiling at 247° results besides santonic acid, when santonin, $C_{15}H_{18}O_3$, is reduced by heating with stannous chloride and tin in hydrochloric acid solution.

---

[1] Ber., 32, p. 3183.
[2] Journ. Chem. Soc., 67, pp. 54, 780.
[3] Journ. Chem. Soc., 33, p. 297; Pharm. Journ., 37, p. 994.
[4] Journ. Chem. Soc., 37, p. 678.
[5] Journ. Chem. Soc., (3), 1, p. 6.
[6] Ber., 7, p. 1104.
[7] Ber., 26, Ref. sp. 599.

51. Sesquiterpene of Spike Oil.

Bouchardat[1] states that the fractions of spike oil boiling higher than 160° approach more and more the composition $C_{15}H_{24}$ and he, therefore, concludes that the oil of spike contains a hydrocarbon of this formula.

52. Sesquiterpene (?) of Spiraea Oil.

Ettling[2] obtained a small amount of a hydrocarbon $(C_5H_8)x$ from the oil, which was either a terpene or a sesquiterpene.

53. Sesquiterpene of Valerian Oil.

By repeated fractionation under diminished pressure, Oliviéro[3] was able to isolate a sesquiterpene and a sesquiterpene hydrate. The fraction distilling between 160 and 165° under a pressure of 50 mm. agreed fairly well with the formula $(C_5H_8)\chi$. It was laevorotatory —9.2°.

The fraction distilling between 190 and 195°, under the same pressure (50 mm.) agreed fairly well with the formula $C_{15}H_{24}H_2O$. It was dextrorotatory +2.5° and had the nature of an alcohol as was shown by the formation of a benzoic ester and a hydrochloric acid ester.

In rotatory power this sesquiterpene agrees best with that of caryophyllene, but in the absence of other constants no comparison can be made.

54. Sesquiterpene of Vetiver Oil.

Gladstone[4] in 1872 obtained from oil of vetiver, by destroying the oxygenated constituents by means of sodium, a small amount of a rather viscid hydrocarbon, of the following properties:

B. p. 255°; $d = 0.9332$; $N_A = 1.5061$.

Gladstone did not have this compound, which he considers to be a sesquiterpene, in a pure condition.

55. Sesquiterpene of Wild Thyme Oil.

The higher boiling fractions of wild thyme oil contain, besides phenols, hydrocarbons, presumably sesquiterpenes,[5] but there is nothing to warrant this assumption other than the high boiling point.

---

[1] Compt. rend., 117, p. 55.
[2] Ann., p. 35, 243.
[3] Bull. Soc. chim., (3), p. 924.
[4] Journ. Pharm., 31. pp. 687, 705.
[5] G.-H.-K., The volatile oils, p. 629.

56. Synthetic Sesquiterpenes.

1—Methyl—4—iso-propyl—2—iso-amyl benzene. $(CH_3)_2.CH.CH_2CH_2.C_6H_3(CH_3).CH(CH_3)_2$.

Claus[1] has prepared a synthetic hydrocarbon of the composition $C_{15}H_{24}$, by reducing isobutyl—p—iso-aymyl ketone with iodine and phosphorus to 1—methyl—4—isopropyl—2—iso-amyl benzene. It is a colorless, limpid oil, of faint valerian-like odor, boiling at 245° and having a specific gravity of 0.89 at 17°.

4—Octyl—1—methyl benzene, $C_6H_4(CH_3)C_8H_{17}$.

Lipinski[2] in 1898 prepared this synthetic sesquiterpene according to Fittig's reaction. 17 gr. of *p*-bromtoluene, 24 gr. of octyl-iodide, 7 gr. of sodium, and two to three times the volume of dry ether, were used. The reaction took place after a short time. In order to increase the yield, the mixture was slightly warmed toward the end of the reaction, the ether then distilled off and the product of the reaction fractionated.

This synthetic sesquiterpene is a colorless oil, boiling between 281—283° and solidifies when strongly cooled. The melting point lies between 11 and 12°. Oxidized with a boiling 3 p. c. permanganate solution it yields terephtalic acid, $C_6H_4(COOH)_2$. When treated with fuming sulphuric acid *p*-octyl toluene sulphonic acid, $C_8H_{17}.C_6H_3(SO_3H).CH_3$, results, of which the barium $(+H_2O)$, lead $(+4H_2O)$ and copper $(+2\frac{1}{2}H_2O)$ salts were prepared. With fuming nitric acid it yields mononitro p-octyl toluene, $C_8H_{17}.C_6H_3(NO_2).CH_3$ and dinitro-p-octyl toluene, $C_8H_{17}.C_6H_2(NO_2)_2.CH_3$. Treatment with acetyl chloride results in the formation of octyl-tolyl-methyl ketone, $C_8H_{17}.C_6H_4(CH_3)CO.CH_3$.

57. Trivalerylene.

In 1867 Reboul[3] obtained, by treating valerylene with conc sulphuric acid, an oil from which, after washing and drying, there could be separated by distillation a fraction boiling at 175—177° corresponding to the formula $C_{10}H_{18}.H_2O$, and a hydrocarbon $C_{15}H_{24}$ boiling between 265—275°, and having a specific gravity of 0.862 at 15°. Diluted sulphuric acid has a similar action on valerylene.

---

[1] Journ f. prakt. Chem., (2), 46, p. 474; Chem. Centralbl., 1893. I, p. 210.
[2] Ber., 31, p. 940.
[3] Compt. rend., 64, p. 419; Ann., 143, p. 373.

By heating valerylene in sealed tubes to 250—260° Bouchardat[1] in 1878 obtained a hydrocarbon $C_{10}H_{16}$ and an other $C_{15}H_{24}$, The latter compound boiled between 240—250° and gave a monochlorhydrate which was decomposed by heat.

58. Vetivene.

Genoresse and Langlois[2] separated from oil of vetiver a sesquiterpene by fractional distillation and three rectifications from sodium. To this fraction they gave the name of vetivene. It is a colorless, mobile liquid of the following properties: $d_{20^\circ} = 0.32$; $\alpha_{D15^\circ} = +18^\circ 19'$; b. p. 135° (15 mm.), 262—363° (740 mm.).

It absorbs four atoms of bromine, without disengaging hydrobromic acid; the liquid is colored blue.

Vetivenol, $C_{15}H_{26}O$, also found by Genoresse and Langlois, has the following properties: $d_{20^\circ} = 1.011$; $\alpha_D = +53^\circ 43'$ in alcohoic solution; b. p. 169—175° (15 mm.).

According to these chemists dehydrating agents give rise to a sesquiterpene of the general properties of vetivene.

59. Winterene.

By the action of sodium on the oil obtained by steam distillation from Winter's bark and subsequent fractionation, Arata and Canzonari[3] obtained the following fractions; 1. —250°; 2. 250—260°; 3. 260—270°; 4. 270—280°. Fraction 260—270° had the sp. gr. 0.9344 at 13°. The original oil was dextrogyrate and fraction 255—270° showed a rotation of +11.2°. Fraction 260—265° made up the bulk of the oil and was called by them winterene. The index of refraction of this fraction was 1.4931. It had the composition C_5H_8, and in accordance with the vapor density 11.67 the authors gave to winterene the formula $C_{25}H_{40}$. This is doubtful, as the compound readily absorbs oxygen from the air. Moreover, the boiling point is rather low for so complex a substance, corresponding rather with that of the sesquiterpenes. With hydrochloric acid it yields a liquid addition product having a camphoraceous odor. The chemical work done on this substance is meagre, being restricted almost entirely to color reactions. The subject seems well worthy of further investigation in the light of the more recent work on the sesquiterpenes.

---

[1] Compt. rend., 87. p. 654; Bull. Soc. chim., 38, p. 24.

[2] Compt. rend., 135, p. 1059.

[3] Anales de la Cientifica Argentina; Drugg. Bull., 1889, p. 140; Arch. d. Pharm., 227, p. 813; Jahresb. f. Pharm., 1889, p. 70; Pharm. Ztg., 1889, p. 888.

60. Zingiberene.

General Discussion and History.

Zingiberene has so far been found only in ginger oil. The first investigation of ginger oil was made by Papousek[1] in 1853, who did not, however, recognize the sesquiterpene. Thresh[2] in 1881 found the major portion of the oil to consist of a sesquiterpene boiling between 256—260°. This fraction had a specific gravity of 0.899 and a rotatory power of —16.10°. Nitroso derivatives of the sesquiterpenes were unknown at that time, so that Thresh was limited in his investigation to the attempt to prepare a hydrochloride, which failed.

In 1900 v. Soden and Rojahn[3] published the results of an examination of the sesquiterpene of ginger oil. It had a specific gravity of 0.872 at 15° and a rotation of —69°. By titration with bromine in glacial acetic acid solution, they determined the presence of two ethylene bonds. The tetrabromide formed could not be obtained in a crystalline condition. The hydrochloric acid and hydrobromic acid addition products are reported as brown, viscous oils. Attempts to prepare a nitrosochloride and a nitrosate failed.

The physical properties, specific gravity and rotatory power of this sesquiterpene did not agree with any of the known sesquiterpenes, and v. Soden and Rojahn, therefore, proposed the name of zingiberene for the sesquiterpene.

Schreiner and Kremers[4] published their results obtained with zingiberene somewhat later. While the physical constants found by them agree in the main with those of v. Soden and Rojahn, their chemical results are different as they succeeded in preparing a dihydrochloride, a nitrosochloride, a nitrosate and a nitrosite, thus definitely characterizing this sesquiterpene.

The low specific gravity of zingiberene is striking, and it, together with its molecular refraction indicate the presence of more double bonds and less cycles than are present in most other sesquiterpenes. The molecular refraction of zingiberene speaks strongly for three double bonds but its chemical derivatives so far prepared are not concordant. Thus, for instance, it forms a well crystallized dihydrochloride. This disagreement is similar to that which existed in the case of caryophyllene, but later chemical work confirmed the optical method. The optical method is probably the must trustworthy in this case, for the following reasons:

---

[1] Journ. Pharm. Chim., (3), 23, p. 465.
[2] Pharm. Journ., (3), 12, p. 248.
[3] Pharm. Archives, 4, p. 61, 155.

1. The optical method has proven trustworthy in the case of caryophyllene and with a large number of compounds in other fields of research. The argument that the zingiberene subjected to the optical test was not absolutely pure, being obtained by fractional distillation, while true, has but little bearing on this question. The properties of the ginger fractions, show that those immediately preceding and following the zingiberene fraction are higher in specific gravity than the zingiberene. Any admixture with these would, therefore, increase the specific gravity of the zingiberene. It is, however, the very low specific gravity of this compound which causes the result to come out for three double bonds. The specific gravity is a far more sensitive factor in the formula $\frac{n^2-1}{n^2+2} \cdot \frac{m}{d}$ than is the index of refraction.

2. The sesquiterpene has a much lower specific gravity than the sesquiterpenes with only two double bonds. This is, however, a change concomitant with the introduction of double bonds, the composition remaining unchanged.

3. It is almost always far more difficult to form a tri-derivative than a mono- or di-derivative. The dihydrochloride would of course, form first, and being a crystalline compound, may separate out. The tri-hydrochloride would form with much greater difficulty, if indeed it can be formed at all. Moreover, an inversion with the production of an isomeric sesquiterpene, as occurs evidently in the preparation of caryophyllene hydrate, and which is also discussed under cadinene and its dihydrochloride, is not excluded. In the bromine titration, hydrobromic acid is given off, so this method of testing for the number of double bonds becomes untrustworthy.

Further work is necessary before this question can be definitely decided.

Preparation.

Zingiberene is obtained by the fractional distillation of ginger oil. v. Soden and Rojahn fractionated the oil under a pressure of 8—10 mm. The portion going over at 120—125° was saponified with alcoholic potash and the washed oil again fractionated in a vacuum. Schreiner and Kremers[3] proceeded in a similar manner, collecting fraction 150—160° (32 mm.), saponifying this and again fractionating, collecting fraction 160—162°.

Physical Properties.

The physical constants of zingiberene are as follows:

Thresh (1881): B. p. 256—260°; $d=0.899$; $\alpha_D= -16.10°$.

v. Soden and Rojahn (1900): B. p. 134° (14 mm.); 269—270° (760 mm.); $d_{15°}=0.872$; $\alpha_D= -69°$.

Schreiner and Kremers (1901): B. p. 160—161° (32 mm.); $d_{20°}=0.8731$; $[\alpha]_D= -73.38°$; $n_D=1.49399$.

The molecular refraction was 67.87; the calculated molecular refraction, assuming three double bonds, is 67.86.

Schreiner and Kremers also determined the indices of refraction from the three hydrogen lines. They were as follows:

$H\alpha=1.49041$. $H\beta=1.50319$. $H\gamma=1.51112$.

Zingiberene is a colorless, mobile liquid, but readily resinifies and becomes viscous. It is readily soluble in ether, petroleum ether, benzene and absolute alcohol, more sparingly (1:16) in ordinary alcohol.

Chemical Properties.

Zingiberene readily absorbs oxygen from the air. Bromine combines with it, but as hydrobromic acid is formed, no bromide could be obtained. With hydrochloric acid it combines to form a dihydrochloride, and with nitrosylchloride and the oxides of nitrogen to form a nitrosochloride, a nitrosite and a nitrosate respectively.

Zingiberene dihydrochloride, $C_{15}H_{24}.2HCl$. Thresh[4] in 1881 attempted to prepare the hydrochloride by passing the dry gas into an ethereal solution of the sesquiterpene fraction. but no crystalline compound could be obtained. Thresh attempted to remove the excess of hydrochloric acid by heating in a current of dry hydrogen until the escaping gas no longer reddened moistened blue litmus paper. The result was unsatisfactory, as analysis showed only 5.47 p. c. of HCl, corresponding to the improbable formula $(C_{15}H_{24})_8HCl$. The specific gravity of this liquid was 0.9246.

---

[3] Pharm. Archives, 4, p. 155.
[4] Pharm. Journ., (3), 12, p. 245.
[5] Pharm. Archives, 4, p. 161.

Von Soden and Rojahn report the hydrochloric acid addition product as a brown viscous oil but Schreiner and Kremers[5] obtained this derivative in a crystalline form. It is prepared as follows:

Zingiberene is dissolved in an equal volume of glacial acetic acid and the solution saturated with dry hydrochloric acid gas at 0°. The solution is then allowed to stand for a day or two, after which time the dark colored liquid will be found to be interspersed with fine needles. These are collected on a force filter and washed with cold alcohol. A second crop can usually be obtained by again saturating the mother liquor with dry hydrochloric acid gas. When recrystallized from hot alcohol, the dihydrochloride is pure white and melts at 168—169°.

Zingiberene nitrosochloride. Schreiner and Kremers prepared this as follows:

A small portion of zingiberene is dissolved in an equal volume of glacial acetic acid and of ethyl nitrite. After cooling in a freezing mixture, it is gradually treated with twice the volume of zingiberene used of a saturated solution of hydrochloric acid gas in glacial acetic acid. After a minute or two the reacting mixture is treated with twice its volume of alcohol, continually agitating. The nitrosochloride separates out as a flocculent precipitate. This is collected on a force filter and well washed with cold alcohol. It is a fine white powder, and may be purified by dissolving in ethyl acetate and precipitating with alcohol. Thus obtained, it melts at 96—97° with decomposition.

Zingiberene nitrosate. This derivative does not separate when the hydrocarbon is treated in the usual manner, but with a slight modification it separates in large quantities, the yield being almost theoretical. The procedure is as follows:

A small portion of zingiberene is dissolved in an equal volume of glacial acetic acid and of ethyl nitrite. This mixture is well cooled in a freezing mixture and then treated slowly with a mixture of nitric acid and glacial acetic acid, each equal in volume to the zingiberene used. The first few drops produce a deep bluish-green color which rapidly fades. The mixture remains clear but becomes quite thick, and toward the end of the reaction turbid and exceedingly viscous. At this stage the mixture is treated with about four times its volume of cold alcohol, and on shaking, large quantities of the nitrosate separate. This is collected on a force filter, washed with alcohol and dried on a porous plate. Attempts to purify the product by crystallization have so far been unsuccessful. The compound may be purified by dissolving in ethyl acetate and precipitating with alcohol. It is a slightly yellowish powder melting at 86—88° with decomposition..

Zingiberene nitrosite. This derivative is more readily obtained than the other nitroso-compounds of this sesquiterpene. It can also be obtained in a pure state with comparative ease if the recrystallization is done on a small quantity and with but a momentary application of heat. When so purified its melting point is sharp and the compound is, therefore, well suited for identifying the sesquiterpene. Schreiner and Kremers prepared this derivative as follows:

A small portion of zingiberene is dissolved in about 10 times its volume of petroleum ether and is then cooled in ice water or a freezing mixture. It is then treated with a volume equal to the zingiberene used, of a saturated solution of sodium nitrite, and the same amount of glacial acetic acid. The liquid shows a passing blue color and on shaking solidifies completely to a mass of white crystals. The magma is best transferred to a cloth and washed with cold water and pressed. After spreading on a porous plate for a short time the compound must be purified at once, as it readily decomposes when in an impure condition. This is best done by recrystallizing from hot methyl alcohol, working with small portions at a time and avoiding heating for any length of time. If heated for a few moments only crystals will be obtained. Even a momentary heating will result in consider able loss, but the crystals which separate are fine silky needles, and after washing are quite pure. If thought necessary the operation may be repeated. Thus purified the compound melts at 97—98°. It is much less stable than the corresponding caryophyllene compound. After keeping for a few weeks it becomes yellow and soon changes to a black, sticky mass.

The Proposed Volatile Oils of the U. S. P. 1900.

By *Edward Kremers.*

XXXIII. OLEUM TEREBINTHINÆ.

Oil of Turpentine.[1])

A volatile oil[4]) *distilled*[3]) *from Turpentine.*[2])

Oil of Turpentine should be kept in well-stoppered bottles, protected from light.[5])

A thin, colorless liquid, having a characteristic odor and taste,[6]) *both of which become stronger and less pleasant by age and exposure to the air.*[7])

Specific gravity: 0.855 to 0.870 at 15° C. (59° F.)[8])

It boils at 155° to 170° C. (311° to 338° F.)[9])

Soluble in three times its volume of alcohol, the solution being neutral or slightly acid to litmus paper,[10]) *also soluble in an equal volume of glacial acetic acid.*[11])

Bromine or powdered iodine acts violently upon it.[12])

When brought in contact with a mixture of nitric and sulphuric acids, it takes fire.[13])

If a little of the Oil be evaporated in a small capsule on a water-bath, it should leave not more than a very slight residue (absence of petroleum, paraffin oils, or resin).[14])

PREPARATIONS: *Linimentum Terebinthinæ. Oleum Terebinthinæ Rectificatum.*

XXXIV. OLEUM TEREBINTHINÆ RECTIFICATUM.

Rectified[15]) Oil of Turpentine.[1])

OIL OF TURPENTINE, *a convenient quantity.*
LIME WATER, *a sufficient quantity.*

Shake the Oil thoroughly with six (6) times *its volume of Lime Water, and introduce the mixture into a copper still connected with a well-cooled condenser. Then distil, until about* three-fourths *of the Oil have passed over, and separate the clear Oil from the water.*

Keep the product in well-stoppered bottles, in a cool place, protected from light.

Rectified Oil of Turpentine should always be dispensed when Oil of Turpentine is required for internal use.

A thin, colorless liquid, having the general properties mentioned under Oil of Turpentine (see Oleum Terebinthinæ).

Specific gravity: 0.855 to 0.865 at 15° C. (59° F.).[8])

Boiling point: about 160° C. (320° F.).[9])

Its alcoholic solution should be neutral to litmus paper.

If about 10 Cc. of the Oil be evaporated in a capsule on a water-bath, no weighable residue should be left.[14])

1) Oil of turpentine is officinal in all pharmacopœias but the Hungarian. In the U. S. P. it has been officinal since the 1830 edition.

Rectified oil of turpentine is officinal in all pharmacopœias but the French. In the U. S. P. it has been officinal since 1880.

2) Turpentine is defined by the U. S. P. as "a concrete oleoresin obtained from *Pinus palustris*, Miller, and from other species of *Pinus* (nat. ord. *Coniferæ*)."

The species which, according to Hirsch, are designated by the several pharmacopœias are, herewith, tabulated:

Pinus maritima	Belg., Graec., Russ.,[‡] Suec.
P. sylvestris S.	Brit.,[*] Graec., Russ.
P. pinaster	Germ. III,[†] Russ.
P. australis	Helv.
P. taeda	
P. palustris	U. S., Germ. III.
P. heterophylla	Germ. III.
P. laricio	Russ.
Larix europaea	Graec.
Abies excelsa	Russ.

This great variety would indicate that the authors of pharmacopœias regard the oil from any one species about as good as any other.

The principal species yielding turpentine oil in the United States are the following:

---

[*] Like the U. S. P., the P. Br. admits the oil of other species.

[†] The Ph. Ger. IV mentions no species in particular.

[‡] The Russian, although it admits the oil from other species, gives preference to that of *P. maritima;* this is also true of the Belgian and Swedish pharmacopœias.

Pinus palustris Miller (*P. australis* Michaux), — Long-leaved or Southern pitch pine.

P. taeda L. — Loblolly or rosemary pine.

P. heterophylla Elliot (*P. cubensis* Griesebach), — Cuban, swamp or slash pine.

P. echinuta Miller (*P. mitis* Michaux), — Short-leaved yellow pine

3) The Br. adds "usually by the aid of steam"; the Austr. makes a similar provision. Distillation with water is directed by Japon., Rom., Russ.

4) The only known constituent of American turpentine oil is pinene which constitutes the bulk of all turpentine oils.

5) The usual precautions.

6) "Limpid, colourless, with a strong peculiar odour, which varies in the different oils, and a pungent and somewhat bitter taste." B. P.

"A colorless liquid of peculiar odor, and sharp, grating taste." P. G.

7) The purest pinene thus far obtained is reported to be almost odorless, but it does not remain thus for even a short time. The action of light and the atmosphere on pinene are not well understood. Moisture and oxygen change it, especially when exposed to light, to pinol hydrate. If formed in sufficient quantity, this will crystallize out in handsome crystals and a clear, colorless turpentine oil will remain. Under a different set of conditions terpin hydrate may be formed. If the oil is dried it is more apt to resinify than when moist. What the nature of this resinification is has not been definitely ascertained. Some state that aldehyde-like bodies are formed, others that the product is of the nature of rosin, i. e. abietic acid.

In all probability, the reactions producing the changes are along different lines.

8) The specific gravities demanded by the several pharmacopœias are recorded in the following table:

0.85 —0.86	Austr., Rom.
0.85 —0.87	Helv., Japon.
0.855—0.865	Fenn., Russ.
0.855—0.870	Dan., Norv., U. S.
0.86	Belg.
0.865—0.875	Germ.
0.866	Ital.
0.870	Graec., Port.

The B. P. states no specific gravity requirement.

But little information is available concerning the specific gravity and other properties of the oils from the several species of pines yielding turpentine in this country.

The oil obtained by steam distillation of turpentine from *P. palustris*, supplied by Dr. Mohr and therefore unquestionably authentic, had a sp. gr. of 0.8612 (dried oil); $[\alpha]_D = +23.8^\circ$.

The virgin dip from *P. cubensis*, supplied by the same authority, yielded an oil, the sp. gr. of which was 0.8650 (dried oil); $[\alpha]_D = +9.6^\circ$.

The specific gravity of optically inactive pinene regenerated from its nitrosochloride is 0.858. This corresponds to the third decimal with the specific gravities of dextrogyrate and laevogyrate pinene obtained from natural sources.

The boiling temperature requirements of the several pharmacopœias are herewith tabulated:

	150°	Belg.
	150—160°	Fenn., Helv., Rom., Russ.
Mostly between	155—162°	Germ.
	155—170°	U. S.
	156—158°	Port.
	158—160°	Ital.
About	160°	Japon.
Begins to boil at	160°	Austr.

"It commences to boil at 160° and almost entirely distils below 180° little or no residue remaining." Brit.

The bulk of the oil from *P. palustris* mentioned above (No. 8) distilled over between 155—160°; that from *P. cubensis* between 155—162°. The requirement of the German Pharmacopœia, therefore, appears to correspond to the facts fairly well.

10) As a rule, the solubility in alcohol of oils consisting almost entirely of terpenes is of little value. A resinified oil, unfit for internal administration, may stand such a test better than a freshly rectified oil. It may serve the purpose, however, of enabling the detection of adulteration with petroleum products. The German Pharmacopœia demands solubility in 12 p. of alcohol.

11) Little as the glacial acetic acid solubility test of volatile oils is used, it is the only test, besides boiling temperature, recorded by the British Pharmacopœia. The German Pharmacopœia does not demand this test.

12) The fulminating test, formerly used to detect turpentine oil in other oils. Here it is intended, no doubt, as a test of identity. If such a test is demanded, the nitrosochloride and nitrolamine reactions should be inserted, yielding definite chemical compounds.

13) Comp. No. 12.

14) This test might well be combined with the boiling temperature test. See No. 9.

15) A more convenient method for rectifying turpentine oil consists in shaking the crude oil with an equal volume of 5 p. c. caustic soda solution and distillation of the oil with steam. See the next article.

Optical Rotation: — With the geographic shifting of the turpentine orcharding in the U. S., the industry has become dependent on new species. In the commercial product, the oil from the several species is not necessarily kept apart. As a result, the angle of rotation varies greatly. Though the principal American oils are dextrogyrate, in varying degrees, a very strongly laevogyrate oil has been recorded. In as much as the laevogyrate French oil appears to serve its purpose as well as the customary dextrogyrate American oils, a pharmacopœial requirement of definite limits as to optical rotation seems to be uncalled for.

Adulteration: — Turpentine oil has been used extensively for the adulteration of other volatile oils. It is itself adulterated principally with pine tare oils, rosin oils and petroleum products. Tests for these should be supplied. With regard to pine tar oils, see the next article.

An American Pine Tar Oil.

By *Edward Kremers.*

With the necessity of greater economy, the pine tar oil industry is being developed in this country. Whereas the turpentine oils are obtained by water or steam distillation from the oleoresin turpentine, the pine tar oils are commonly obtained by the destructive distillation of the roots rich in resin. Besides gaseous products, pyroligneous acid and tar, terpenes are obtained. The hydrocarbon oils, rectified by distillation with milk of lime, resemble the genuine turpentine oil, but as a rule have a slightly empyreumatic odor and differ somewhat in other respects. They are generally regarded as inferior to the turpentine oil proper and, in order to distinguish them, are designated pine tar oils.

Recently the writer had occasion to examine such an oil, which evidently is being manufactured in Georgia. Two samples were received, one "H", the other "M". The former was wellnigh colorless, the latter had but a slight yellowish tint. In a general way, they had a terebinthinate odor, but both betrayed their origin by a slight empyreumatic odor. Besides, the odor reminded of lemon.

The physical constants were found to be as follows:

"H" sp. gr. 0.856; $\alpha_D = +13° 40'$
"M" sp. gr. 0.860; $\alpha_D = +13° 42'$

Shaken with 5 p. c. caustic soda solution, sample "H" imparted to the aqueous layer a decided yellowish color, whereas sample "M" colored it dark brown. No appreciable reduction in volume in the oil was noticeable in either case.

The above constants, when redetermined in connection with the rectified oil, i. e. steam distilled after being shaken with the caustic soda solution, were determined as follows:

"H" sp. gr. 0.854; $\alpha_D = +14° 25'$
"M" sp. gr. 0.854; $\alpha_D = +13° 42'$

Of sample "H" 98 p. c. had been recovered, of sample "M" 94 p. c.

A liter of sample "M" was rectified by shaking it twice with 5 p. c. soda solution and then distilling with steam. Even the second alkali solution was decidedly colored, while the first deposited tarry matter after shaking. The steam distillation was conducted in fractions, 93.5 p. c. of the oil being recovered. In the following table the specific gravity and angle of rotation of the several fractions are recorded:

Fraction.	Amount.	Sp. gr. at 18°.	α_D
I.	250 cc.	0.8612	+ 14° 46′
II.	250 cc.	0.8543	+ 14° 4′
III.	250 cc.	0.8554	+ 12° 32′
IV.	185 cc.	0.8616	+ 7° 51′

These fractions were fractionated separately into small fractions by direct heat. The amounts distilling at the different temperatures, the specific gravity and the angle of rotation of the several fractions are recorded in the following table:

Fraction.	B. P.	Amount.	Sp. gr. at 17°.	α_D
I.	−154°	91 cc.	0.856	+ 15° 37′
II.	154—156°	96 "	0.8555	+ 16° 15′
III.	156—158°	145 "	0.8556	+ 15° 44′
IV.	158—160°	135 "	0.8555	+ 14° 40′
V.	160—162°	96 "	0.8557	+ 13° 10′
VI.	162—164°	71.5 "	0.856	+ 11° 20′
VII.	164—166°	80 "	0.8569	+ 9° 54′
VIII.	166—170°	42 "	0.8583	+ 8° 4′
IX.	170—176°	43 "	0.8621	+ 5° 29′
X.	176—180°	3+ "	——	——
XI.	180° +	9 "	——	——

The b. p. of pinene is about 155°, its sp. gr. 0.858; the b. p. of dipentene is about twenty degrees higher and its sp. gr. 0.844.

The bulk of the oil evidently consists of pinene. The lemon-like odor of the oil and the decline in the angle of rotation, indicate the presence of dipentene, the inversion product of pinene, due to the high temperature in the process of destructive distillation. The higher sp. gr. of fraction 170—176°, rather than a lower, would indicate that other products of decomposition are present which counteract the lower sp. gr. of the dipentene.

As stated above, the pine tar oils when shaken with a 5 p. c. caustic soda solution imparted a yellow or even brown color to the aqueous layer after separation of the mixture. In order to ascertain whether this empirical color test might be utilized to distinguish a pine tar oil from a true turpentine oil the following tests were made:

Oil used.	Sp. gr.	α_D	COLOR immediately after shaking.	COLOR after standing.
1. Crude turpentine oil...	0.8659	11° 17′	slight yellow tinge	yellowish
2. " pine tar oil H..	0.856	13° 40′	a little more yellow than first	brown
3. " " " " M..	0.860	11° 45′	brownish-yellow	dark brown
4. Rect. turpentine oil, with $Ca(OH)_2$.......	0.8605	11° 22′	not colored	no color
5. Rect. turpentine oil, with $Na(OH)$..	0.8629	10° 49′	not colored	no color
6. Rect. tar oil H..........	0.8529	14° 25′	yellow tinge	brown
7. " " " M..........	0.8567	13° 42′	yellow tinge	yellowish-brown

Most of the experimental work was done by Miss I. A. Holden.

The Volatile Oil from Monarda Citriodora.

By *I. W. Brandel.*

Through the kindness of Professor Wm. Trelease, Director of the Missouri Botanical Garden, the writer was placed in communication with Mr. J. Reneochon of Dallas, Texas, who, during the summer of 1903, supplied this laboratory with 50 pounds of dried flowering herb of *Monarda citriodora*. This is the fourth species of *Monarda* now under examination in this laboratory. While an attempt is now being made to secure larger amounts, of this species and of other species next summer, a preliminary account of the work, thus far accomplished, may not be out of place.

Although extremely dry, the material yielded 200 grams of a reddish oil, corresponding to a yield of about 1 p. c. The specific gravity of the oil was found to be 0.9437 at 20°.

The presence of thymol or carvacrol being indicated by Flückiger's reaction, the phenol assay with 5 p. c. aqueous potassa solution revealed the presence of 65.6 p. c. Citral being indicated by the odor of the oil — hence the name of this species —, also by the fuchsine test for aldehydes, the amount of aldehyde present was determined titrimetrically with normal sodium sulphite solution, according to the directions by Sadtler.* Calculated as citral, 1.2. p. c. was found to be present. (Comp. act. on thymoquinone.)

In order to isolate the phenol or phenols, the total oil was shaken with 5 p. c. aqueous potassa and the alkaline phenol solution distilled with steam in order to remove traces of non-phenol. The solution was then carefully neutralized with sulphuric acid and the liberated phenol distilled with steam, collecting it in three fractions. None of these fractions solidified when exposed to the cold, thus indicating the absence of an appreciable amount of thymol. However, from the last fraction crystals of hydrothymoquinone separated, which melted at 140°.

The identification of the phenol as carvacrol was effected by its conversion into the socalled nitroso carvacrol and by the benzoyl derivative of the latter. For this purpose 3 cc. of the first fraction were dissolved in a mixture of 15 cc. of alcohol and 15 cc. of conc.

---

* Comp. this journal, vol. 22, p. 78.

hydrochloric acid. To this mixture sodium nitrite was added until it became solid. 3.5 g. of nitroso compound were thus obtained. The benzoyl derivative, prepared according to Schotten-Baumann's method, melted at 110°, the melting point of the benzoyl derivative of nitroso carvacrol.

The non-phenol oil, having been rectified by steam distillation, was fractionated, the following fractions resulting:

—165°	specific	gravity	0.8627
165—170°	"	"	0.8553
170—175°	"	"	0.8585
175—180°	"	"	0.8629
180—190°	"	"	0.8709
190—210°	"	"	0 8953
210—230°	"	"	0.9534

From the residue, dissolved in gasoline, crystals of hydrothymoquinone, m. p. 140°, were obtained. The high specific gravity of the last fraction is accounted for by the presence of carvacrol. indicated by Flückiger's test.

Fraction 170—175° was tested for cymene. 5 cc. of the oil were heated until decoloration with a solution of 30 g. of potassium permanganate in 850 cc. of water. The colorless solution was filtered, evaporated to dryness and the residue extracted with absolute alcohol. After evaporation of the alcohol from the filtrate, the residue was dissolved in a small amount of water and sulphuric acid carefully added. The crystalline precipitate, when thoroughly dried, melted at 124°. The hydroxy derivative of cuminic acid, resulting from cymene when oxydized with dilute permanganate solution, melts at 156°. The small amount of substance obtained prevented its further study at present. The mother liquid from the crystalline acid had a marked odor of volatile acids.

Fraction 175—180° was tested for limonene by means of the tetrabromide, but no satisfactory results were obtained. A phellandrene test, made on fraction 165—170° gave negative results.

The oil of *Monarda citriodora* in thus shown to contain carvacrol and its oxidation product hydrothymoquinone. The red color of the oil indicates the presence of thymoquinone as well, with which it is at least in part united as thymoquinhydrone. Whether cymene is present — the low melting point of the oxydation product is possibly due to impurities — or whether the principal constituent of fraction

170—175° is something else, still remains to be determined. The identification of citral, if present, will also necessitate the study of larger amounts of material.

While the results obtained are still meagre, they nevertheless point, on the one hand, to further genetic relationships in the chemistry of the different species of Monarda, on the other hand, they indicate new paths for the investigation of these interesting plants.

Pharmaceutical Legislation in New York During the Early Seventies.

The following additional newspaper clippings have been received since the publication of the last installment. It is to be hoped still more material may be forthcoming. Chronologically the three items herewith reproduced should precede Document 11 on p. 37.

* * *

DOCUMENT 12.

[New York Daily Tribune, Friday, August 11, 1871, p. ——, col. ——.]

DRUGGISTS IN COUNCIL.

MEETING OF THE APOTHECARIES' UNION—THE NEW LAW DENOUNCED.

The Apothecaries' Union met yesterday in the chapel of the University of New York, Dr. Cook presiding. Mr. Robbins stated that the German Druggists' Association were in accord with their American associates. The following Executive Committee was elected: L. A. Hoadley, James Condie, Daniel Robbins, Fred. Hoffmann, and B. G. Amond. Dr. Cook said that he had consulted with counsel, and ascertained that the obnoxious law could, without doubt, be proved unconstitutional. Counsel advised an application for an injunction restraining the Commissioners of Pharmacy from proceeding with their examinations.

Should read Amend.

DanielRobbins delivered an address, in which he stated that the science of pharmacy was the most important in the world; it was literally the science of preparation, preservation, and combination. About 12,000 druggists practice pharmacy in theUnitedStates, but so limited are the means for thorough education that it is thought that not over 3,000 have been thoroughly schooled as pharmaceutists. The American Pharmaceutical Association, which will soon meet in St.Louis, has 700 members. This Association, embracing the ablest men in the profession in this country, had always desired legislative restrictions for the education and elevation of the profession; and several States had already passed laws on the subject. The objections to the law of New-York are that four Commissioners and a Secretary are appointed at a salary of $12,500 per annum, to do what the College of Pharmacy has always desired to do for nothing. This institution, in his opinion, should be endowed like other educational institutions, and should graduate and license all candidates, free of charge. New-York was the only State which charged exorbitant rates for diplomas, the other States merely naming a fee which covered the expenses of examination.

Dr. Frederick Hoffmann reviewed the history of pharmacy in this country, adverted to the evils of the new law, and suggested an appeal to the next Legislature for another law tending to the advancement of the profession.

The title of the address is given in the next document.

DOCUMENT 13.

[The New-York Times, Friday, August 11, 1871, p. ——, col. ——.]

THE DRUGGISTS.

Meeting of the Apothecaries' Union — No Further Action Taken — Address of Dr. Hoffmann.

Yesterday afternoon, the members of the Apothecaries' Union met in the small chapel of the University, Dr. COOK occupying the chair. About 100 persons were present. Mr. ROBBINS, of the Executive Committee, reported that he had conferred with the German and other organizations, whose objects were similar to this, and he had found them all in favor of uniting their forces. The Chairman said he understood several members had taken legal advice on the subject of resisting the present law, and he would like to hear their reports. He had himself consulted an eminent member of the Bar, and had been assured by him that they would have no trouble. The law was unconstitutional, so his legal adviser thought, and would be set aside by the Court of Appeals. He had also been advised that the best thing the Union could do was to get out an injunction at once and stop all further action in Union-square.

Reports were read from the Ward Committees, showing a large increase in the number of names added to the roll.

A resolution was offered that the Executive Committee be instructed to take legal action at once against the Examining Commissioners. An amendment was offered by Mr. FRANKLIN that the Committee be simply instructed to take legal action. He said the best action they could take was to consult a good lawyer, and to ascertain in what relation they stood to the law. These meetings were worse than useless, and were a shocking waste of time, unless something decided was done. Talk amounted to nothing. If the law was constitutional, they must submit to it. The object of the Union was not to evade the law, or to screen themselves from an examination. No man present feared an examination, but it was an indignity to men who had been in the business for forty years, to say to them now that they must come forward and show their qualifications. This objection of course did not apply to the younger men, but all felt that the law was arbitrary and unjust. He hoped that good legal advice would be taken, and the written opinion obtained be forthcoming at the next meeting. He had heard it said that one eminent lawyer consulted had pronounced against them, and assured them that they had nothing to stand upon in their opposition to the law. Perhaps Mr. ROBBINS could give information on this point.

Mr. ROBBINS objected to the charge of $30 for a certificate. No other State charged more than $5, or $10 at most, just enough, in fact, to pay expenses. The letter of the Commissioners of Wednesday last to the graduates might be considered a good piece of composition, but it was a remarkable document. These men were created by the celebrated Assemblyman IRVING, the noted politician and prize-fighter, and Mayor HALL. They have the assurance to say that they could not respect the diplomas of any of the schools of pharmacy in Europe or America, and that it was to the interest of men like Dr. HOFFMAN, the ablest author on pharmacy in the United States, to pay $30 for their license or diploma, as it would add to their dignity. The necessity for such a gentleman going before the Commissioners was simply an indignity, for none of them could enter into a conversation with Dr. HOFFMAN. The examination, as far as it has proceeded, was a farce, and the sooner it was taken out of their hands the better. If any gentleman applied to him for a situation, showing one of these diplomas, he would tell him he would not give him thirty cents for what he had paid $30, and that he had been defrauded for the sole purpose of making other people rich.

Can a copy of this letter be found?

Dr. FREDERICK HOFFMAN then read an address on the "Aims and Purposes of the Pharmaceutical Profession," in which he contended that a scientific education is necessary for the pharmaceutist and also restrictive laws. He argued that the pharmaceutists had done their part by establishing schools and colleges, while our legislators had done little or nothing. His objections to the present law were that it did not provide for compulsory education or for testing the purity of drugs.

A copy of this address is in the possession of the Historical Com. of the A. Ph. A.

The address was directed to be printed and distributed.

A gentleman proposed that a committee should be appointed to wait on the Mayor, and lay their grievances before him.

Mr. ROBBINS said the Mayor must necessarily be in favor of the law, or he would not have appointed Commissioners to carry it out. As for getting out an injunction against the Commissioners, that could not be done. He would tell them, not exactly as a lawyer, but as a pharmaceutical lawyer, that they could only get out an injunction when they were attacked individually for non-compliance with the law.

A gentleman remarked that he did not think the law would ever be enforced. The laws in relation to the sale of poisons, and some others were a dead letter.

Mr. ROBBINS said they might be sure this law will be enforced, for the reason that the examiners make $12,500 per annum of it. The other laws had no money in them, and consequently were not enforced.

Without further action, the meeting adjourned subject to call.

DOCUMENT 14.

[New York Times August 14, 1871, p——, col. ——.]

NOTES FROM THE PEOPLE.

The New Drug Law for New-York City.

To the Editor of the New-York Times:

As an old graduate of pharmacy, and formerly an apothecary, I have read with considerable interest much of the articles which have appeared in our City Press in regard to the new law for the City of New-York, and I desire to place a few facts before the Press and the public. There are in the whole Union about twelve thousand druggists practicing pharmacy, that science which is said to comprise the whole art of all preservation, preparation and combination—some say of medicinal substances, but the term medicinal has a wide and undefined application; thus, a cup of tea, a bowl of coffee, and a glass of lager-beer are all medicinal preparations, because they have medicinal as well as dietetic relations. So limited up to this time have been the means of thorough pharmaceutical education in our new country, that it is thought not over some three thousand of these twelve thousand have been thoroughly schooled and graduated as pharmacists. The American Pharmaceutical Association, which will meet for this year in September in St. Louis, a highly respectable and useful organization, contains only some 700 members. This Association, which embraces the ablest and best men in the profession in our country, many of them men of high attainments and character, who have been schooled in our own and the best European schools, has always desired legislative aid for the purposes of education, and legislative restrictions for the elevation of the profession, but it has been found impossible to recommend any general law that could be applied to the whole country, or to large States, in the present condition of pharmaceutical education in our country. In 1870, Rhode Island, a small State, passed a good law, which was recommended by a committee of the Pharmauceutical Association, and Maryland also, but for Baltimore City alone.

Special legislation is always objectionable, but at present no other legislation is possible. The New-York City law, about to be enforced, is a special act. The objections to this law are: that four Commissioners are appointed as examiners at a gross salary of twelve thousand dollars, which includes the Secretary's salary, to do what the New-York College of Pharmacy always desires power to do for nothing. This College should be properly endowed and aided like other educational institutions, to the extent of ten thousand dollars annually, and it should graduate, license, and examine the diplomas of graduates of the States desiring to practice pharmacy free of charge, because as a class, apothecaries are poor. It is said that no apothecary has ever made on his profession, as the result of his legitimate pursuit, over fifty thousand dollars in a life time. Quacks get rich; the best men in the profession are usually poor, because they will not quack, and as a rule apprentices to this profession are studious boys of small expectations. This Commission of four comprises only one pharmacist, a very respectable gentleman of moderate attainments. It has one chemist, whose true position as a scientist is somewhat similar to that of the celebrated Mr. BARNUM in nature. Both are said to be very estimable and useful men, their specialty being that of showmen, the one of rare animals and curiosities, the other of scientific wonders. Furthermore, it should be borne in mind that mere chemistry, the science of chemical combination, as applied to pharmacy, is only a single branch of the profession. The other two are physicians, and medical men, as a rule, are well known to be very incompetent pharmacists, so much so that the celebrated English Prof. HUXLEY, in addressing recently the graduating class of the medical school in the University, advised for all the future that medical students should drop Materia Medica or Pharmacognosy, and make pharmacy a separate profession, for the reason that medication has not kept pace with other pursuits, most of its advances being due to the advance of pharmacy and the correlate sciences. One of our celebrated physicians has recently declared that it must be confessed that, as yet, all medication is empirical. The word empiric or quack being used in its true sense as an experimenter," one who practices without knowledge. The truth is, all medication is more or less empirical, for the same reason that all religion is dogmatic. The ways of God are so deep that no man has measured them, and man, to use the words of both psalmist and poet, is such a wonderful work, "Such a piece of work is man that no probe has pierced or scalpel searched the mysteries of his being.

The letter of the Commissioners to the Graduates in Pharmacy in Wednesday's TIMES, is a well-written, but most remarkable, document. In Rhode Island, the law limits the charge for examination at $10; in Maryland the charge is $5—both being intended to cover only cost of diploma and record of license. Our New-York Commission, which is the creation of Assemblyman IRVING, long celebrated as a politician and a prize-fighter, has the assurance to say that it cannot respect the diplomas of any of the Schools of Pharmacy in Europe and America, and that it is for the interest of men like Dr. FRED. HOFFMAN, the author of the ablest report on pharmacy we ever had in the United States, to pay this $30 license; such a diploma so issued will increase his dignity. The necessity for the appearance of such a man before such a Commission is an indignity, as no one of them could maintain a conversation with Dr. HOFFMAN on the subject of pharmacy for thirty minutes. The examinations thus far reported are, in many cases, if correctly reported, farcical, and the sooner the whole matter is placed where it should be, in the hands of the New-York College of Pharmacy, the better.

It is said that one of the Commissioners remarked to one of the licensed applicants, who complained of the fee of $10, that in Europe forty pounds were paid for some diplomas. All that need be said is that, in our large jobbing houses applications from the interior for educated pharmaceutical assistants are very frequent, and a diploma from this Board, in so far as it would aid any clerk in obtaining a situation or salary without the City of New-York,, would be very dear at forty cents.

DANIEL C. ROBBINS.

Literary.

Books Reviewed.

VIERTELJAHRESSCHRIFT FÜR PRAKTISCHE PHARMAZIE. Herausgegeben vom Deutschen Apotheker-Verein unter Redaktion von H. Salzmann und W. Wobbe. Selbstverlag des Deutschen Apotheker-Vereins. Berlin. 1904. M. 5.00.

As the title states, this new quarterly is devoted to the interests of practical pharmacy. A large proportion of the first number is devoted to new remedies; several pages record the composition of recent specialties and secret remedies; a few pages fall under the rubric of "Therapeutic notices"; "Pharmaceutical practice" and "Technical notices" come in for their share; the space devoted to "Machines and apparatus" is fairly well illustrated; the "Book review" consists of a list of books, which have been received in the "Apotheker-Zeitung," the official organ of the D. A.-V. and which are suited to the pharmacists needs; "Laws and ordinances" receive proper attention, and "Legal decisions" are not forgotten.

The new publication speaks well for the activity of the D. A.-V. and the appreciation which its officers have of the pharmaceutical practitioner. We recommend its inspection by every American pharmacist who has a reading knowledge of German, and more particularly by the officers of the Section on Practical Pharmacy and Dispensing of the American Pharmaceutical Association.

E. K.

Veronal Merck

DIETHYLMALONYLUREA.

Average Dose 10 grains.

Reported to be

The Safest Hypnotic

A DISTINCT ADVANCE over all other hypnotics. Its therapeutic value thoroughly established. Does not affect the circulation, the heart or the kidneys; stated by prominent observers to be the safest hypnotic, old or new.

Thiocol Roche

is a water-soluble, readily taken, non-irritating, effective form of guaiacol. It is in special demand during the winter and spring months, and its use in tuberculosis, pneumonia, acute and chronic bronchitis, etc., is constantly increasing. It is marketed in three forms: POWDER; 5-grain TABLETS; SYRUP THIOCOL.

University Place **MERCK & CO.** New York

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations

Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.

Publishers

706-8-10 Sansom Street 111 Fifth Avenue
PHILADELPHIA NEW YORK

— Die —

Deutsche Botanische Monatsschrift

beginnt demnächst ihren XX. Jahrgang. Sie kostet jährlich 6 Mark und sei allen Botanikern und Freunden der heimischen Flora bestens empfohlen.

Arnstadt, Thüringen.

Prof. Dr. G. Leimbach.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,

56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY

OF THE

UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

Best eingeführter

...Kaufmann...

im Deutschen Reiche, sucht Vertretung in der ***Apotheker- und Drogenbranche.***

Gefl. Offerten unter 508 postlagernd ***Bromberg.***

Verlag von Herman Heyfelder — Berlin.

Chemisch-technisches Repertorium.

Uebersichtlicher Bericht über die **neuesten Erfindungen, Fortschritte u. Verbesserungen auf dem Gebiete der technischen und industriellen Chemie.**

Herausgegeben von **Dr. Emil Jacobsen.**

— 35. Jahrgang. —

Mit in den Text gedruckten Illustrationen. 1896

NEW EDITION

Webster's International Dictionary

25,000 NEW WORDS, ETC.

Prepared under the direct supervision of W. T. HARRIS, Ph.D., LL.D., United States Commissioner of Education, assisted by a large corps of competent specialists and editors.

New Plates Throughout. Rich Bindings.
2364 Pages. 5000 Illustrations.

Better Than Ever for Home, School, and Office.

Also **Webster's Collegiate Dictionary.**

Specimen pages, etc., of both books sent on application.

G. & C. Merriam Co., Springfield, Mass.

WEBSTER'S INTERNATIONAL DICTIONARY

Chicago College of Pharmacy.

THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF ILLINOIS.

The forty-fourth session begins September 29th, 1903. The course comprises two terms of seven months each and leads to the degree of Graduate in Pharmacy. Write for the announcement to . . .

W. B. DAY, ACTUARY,
465 STATE ST., CHICAGO.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical apparatus.**

An amusing novel which had a widespread sale all over the country since its publication last fall.

THE LIGHTNING CONDUCTOR

The Strange Adventures of a Motor Car

EDITED BY

C. N. and A. M. WILLIAMSON.

The Nation says of this automobile love story: "We are only too well satisfied to go on with such delightful ople, and especially through such delightful scenes. . . . This is old ground, but the unusual method of locomotion d a fresh touch give it a new and living interest. . . . A light, graceful, accurate mention devoted to some places d very satisfactory fulness to others. . . . The line of travel is among the châteaux of the Loire, to Bordeaux, a rner of Spain, Toulouse, Carcassonne, Marseilles, the French Riviera, the Italian Riviera, Pisa. Rome, Naples, Capri, d finally Taorminia. It should be a good practical guide, too, to those about to go over the same course, while charming descriptions of travel afford an ample new fund of pleasure, tinged with envy here and there, to the ay-at-homes."

PRICE $1.50.

Timely Books.

EMENT. Handbook of modern Japan	Net	$1.40
UFFIN. The mikado's empire. 2 vols.		4.00
LICK. Evolution of the Japanese	Net	2.00
VERIDGE Russian advance	Net	2.50
BBARE. Greater Russia	Net	3.00
RINE. Expansion of Russia, 1815—1900	Net	1.50
MILTON. Korea. Illustrations and maps	Net	4.00
—— The same. New, cheap Edition	Net	1.50
RTSHORNE. Japan and her people. 2 vols.	Net	4.00
KAD. Japan of to-day	Net	2.00
RMAN. All the Russias	Net	4.00
SHOP. Korea and her neighbors		2.00

New and Forthcoming Books.

ittle traitor to the South, by Cyrus Townsend Brady. (Macmillan)		$1.50
e man Roosevelt, a portrait sketch, by Francis E. Leupp. (Appleton)	Net	1.25
lliam Penn, by Aug. B. Buell. (Appleton)	Net	2.25
mes Oglethorpe, by Harriet C. Cooper. (Appleton)	Net	1.00
e grave, a poem by Robert Blair, illustr. by 12 etchings. (Appleton)		1.50
e deliverance, by Ellen Glasgow. (Page & Co.)		1.50
x Crucis, a tale of the great appostle, by Sam. M. Gardenshire. (Harper Bros.)		1.50
e American prisoner, by Eden Phillpotts. (Macmillan)		1.50
e sign of triumph, by Sheppard Stevens. (Page & Co.)		1.50
e story of king Sylvain and queen Aimee, by Morg. Sherwood. (Macmillan)		1.50
e colonel's opera cloak, by Christine C. Brush. (Little, Brown & Co.)		1.50
poleon the First, a biography by Aug. Fournier. (Holt & Co.)	Net	2.00
panese physical training, by H. Irving Hancock. Illus. (Putnams)	Net	1.25
idge tactics, a complete self-instruction, by R. F. Foster. (Warne & Co.)		1.25
history of modern England, by Herbert W. Paul. Vol. I and II (complete in 5 vols.) (Macmillan)	Net.	5.00
e crossing, by Winston Churchill. (Macmillan)		1.50
ughters of Nijo, by Onoto Watanna. (Macmillan)		1.50
e faith of men, a volume of short stories, by Jack London. (Macmillan)		1.50
e people of the Abyss, by Jack London. New cheap Ed. (Macmillan)	Net	1.50
e and teachings of Abbas Effendi, by Myron H. Phelps. (Putnam's Sons)	Net	1.40
ere American independence began. Quincy, its famous group of patriots, their deeds, nomes and descendants, by Dan. Munro Wilson. Hought M. & Co.)	Net	2.25
Eighteenth Century essays on Shakespeare ed., by Nichol. Smith. (Macmillan Co.)	Net	3.00
A book of American humorous verse and a book of Am. prose-humor. 2 vols. (Stone & Co.) each		1.25
Electric traction, a practical hand-book on the application of electricity as a locomotive power, by John Hall Rider. Illus. (Macmillan)	Net	3.00
Man's place in the Universe, a study of the results of scientific research in relation to the unity or plurality of worlds, by Alfred R. Wallace. (McClure, Phillips & Co.)	Net	3.00
Peace and the vices, by Anna A. Rogers. (Scribner)		1.50
The history of American Music with some account of Music in America, by L. C. Elson,. (Macmillan)		
Whistler as I knew him, by Mortimer Wempes, with 100 full page plates in color. (Macmillan)	Net	6 00
Her infinite variety is the spice of life, by Brand Whittock. (Bobbs Merrill Co.)		1.50
When wilderness was king, by Randall Parrish. (McClurg)		1.50
Robert Cavelter, a stirring romance of La Salle and the discovery of the Mississippi, by Wm. Dona Orutt. (McClurg)		1.50
The fugitive, Ezra S. Brudno. (Doubleday, Page & Co.)		1,50
Bred in the bone, by Thomas Nelson Page. (Scribners)		1.50
The Hermit and the wild woman, by Edith Wharton. (Scribners)		1.50
A volume of new stories, by Hy. Seton Merriman. (Scribners)		1.50
The past time of eternity, by Beatrix Demaress Lloyd. (Scribners)		1.50
My Friend Prospero. Henry Harland. (McClure, Phillips)		1.50
Mrs. McLerie. J. J. Bell. (Century Co.)		1.00
The close of the day. Frank M. Spearman. (Appleton)		1.25
A little garrison. Lieut. Bilse. (Stokes)		1.50
Violett. Baroness von Hutten. (Houghton, Mufflin & Co.)		1.50
The adventures of Elizabeth in Rugen. MacMillan		1.50
Breaking into society, by George Ade. Harpers		1.00
A country interlude, by Hildegarde Hawthorne. Houghton, M.		1.25
The day of the dog, by Geo. Barr McCutcheon. Dodd		1.25
The Gordon elopement, by Carolyn Wells & Harry P. Tabor. Doubleday		1.25
The great adventurer, by Robt. Shackleton. Doubleday		1.50
Joan of the valley, by Orin F. Bartlett. Houghton		1.50
The horse-leech's daughters, by Margaret D. Jackson. Houghton		1.50
Henderson, by Rose E. Young. Houghton		1.25
Advanced Bridge: the higher principles of the game analyzed and explained, by J. B. Elwell. Scribners	Net	1.25

Just Published:

IR MORTIMER by Mary Johnston.

Author of "To Have and To Hold".

A romance of Elizabethan days, of uncommon power and imaginative beauty. The love of the gallant Sir rtimer for the fair Damaris Sedley, a lady of the court, runs like a poem through a narrative alive with stirring idents of the days of Sir Walter Raleigh, when all England loved, sang, adventured and fought in the flush of thful power. With frontispiece reproducing the colors of the original painting and eight other illustrations by C. Yohn, printed upon specially made India-tinted paper and mounted like photographs upon blank pages.

PRICE $1.50.

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,

MILWAUKEE, WIS.

Kindly add 10% for postage on books, marked "Net."

Lanolin - Mercury

Represents a **PERFECTED** Mercurial Ointment. Its Lanolin base facilitates absorption and prevents rancidity.

ENCASED IN GELATINE CAPSULES, making it most handy for the patient, doctors will prefer this ointment for use in inunction cures to any other form.

Each gelatine capsule contains 3 grammes of the ointment, in either 33⅓% or 50% strength. By a tiny incision at the end of the capsule, its contents can be squeezed out and afterwards applied in the usual manner. The quantity to be administered can thus be definitely determined. If only for convenience and cleanliness alone,

Lanolin-Mercury Capsules

should be preferred to the ointment in bulk.

Lanolin-Mercury Capsules are supplied in boxes containing two dozen; either 33⅓% or 50% strength.

LEHN & FINK Manufacturing Chemists **New York**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

"M. C. W." Morphine

Our Morphine is unexcelled for purity, white and bulky. It may be had from all Jobbe
lowest prices and we invite our friends when ordering to

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS.

WITH THE CO-OPERATION OF

Prof. J. H. Beal, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. Chas. Caspari Jr., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. Virgil Coblentz, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. Fischer, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. Kraemer, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. Lloyd, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. Lyons, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. Power, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. Prescott, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. Puckner, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. Schlotterbeck, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. Wm. Simon, Ph D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. Stevens, Professor of Pharmacy, University of Michigan.
Dr. R. H. True, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.
Agent for Europe: Julius Springer, Berlin.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 5. **MAY, 1904.** **Subscription Price Per Year:**
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
[illegible]	2	3	4	5	6	7
[illegible]	9	10	11	12	13	14
[illegible]	16	17	18	19	20	21
[illegible]	23	24	25	26	27	28
[illegible]	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial.. 161

Progress in alkaloidal chemistry during the year of 1903. By *H. M. Gordin*................ 167

Phytochemical Notes. By *E. Kremers*.......... 183

Volatile oil constituents of the Swedish and Belgian Pharmacopœias........................... 195

Pharmaceutical legislation in New York during the early seventies.. 198

A GREAT

.....SUCCESS

Alphozone has aroused more interest among medical men than any other new product we have ever known.

Its remarkable germicidal value—coupled with the physical and chemical properties which render it safe, convenient and economical to use—accounts for this.

You cannot go amiss in stocking Alphozone at once, if you have not yet ordered it.

We are advertising it lavishly to over 100,000 physicians, in the leading medical journals of the country.

And every dollar's worth we sell pays a profit to retail druggists!

Per oz., $4.50; ½ oz., $2.30: ¼ oz., $1.20. Two grain tablets, $1.00 per bottle of 45.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

STEARNS QUALITY

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for **Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.**

A. H WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award.)

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

(Compound of stear-amide with hydrocarbons.)

Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 15% water.

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.

SHARP & DOHME'S

LAPACTIC PILLS

SEARCH OUT THE CAUSE

OF ATONIC DYSPEPSIA

OF CHRONIC CONSTIPATION

AND REMOVE IT

THEY NEVER GRIPE

THEY NEVER FAIL

NONE JUST AS GOOD

SHARP & DOHME
BALTIMORE
CHICAGO - NEW ORLEANS - ST. LOUIS
NEW YORK

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.
(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach. Pleasant in taste and readily assimilated.

★ ★ ★

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

DOSE FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

★ ★ ★

KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**

SPRING SELLERS

**Tonics and Blood Purifiers Par Excellence.
Stock Them and Push Them.**

"The best combination of vegetable alteratives known," is what a medical writer says of

SYRUP TRIFOLIUM COMPOUND

for years a favorite of thousands of practitioners in the treatment of Anemia, Scrofula, Impaired Nutrition, Chronic Skin Diseases, and allied ailments.

SYRUP TRIFOLIUM COMPOUND with Cascara

is precisely like our well-known Syrup Trifolium Compound with the addition of Cascara Sagrada. It is of special service in chronic cases complicated with constipation.

NET PRICES:

SYRUP TRIFOLIUM COMPOUND.	
Pint bottles, per dozen,	$7.50
5-pint bottles, per bottle,	2.90
Gallon bottles, per gallon,	4 30
SYRUP TRIFOLIUM COMPOUND WITH CASCARA	
Pint bottles, per dozen,	$9.50
5-pint bottles, per bottle,	3.65
Gallon bottles, per gallon,	5.20

A FOUNTAIN FAVORITE

We introduced *Syrup Lime Juice and Kola* to our friends of the drug trade two seasons ago. Its success was instantaneous – it exceeded our most sanguine expectations.

The reason is plain – it makes a delightful beverage, stimulating, refreshing.

Bear in mind that this is not a concentrated extract, but **AN ELEGANT SYRUP. READY FOR DISPENSING.**

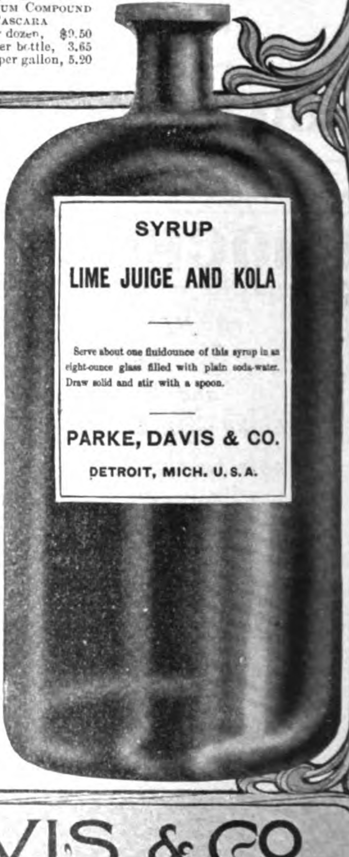
Include *Syrup Lime Juice and Kola* in your assortment of fountain specialties for the coming season. Send us an order for a gallon or two *now*, as a starter for the spring business.

NET PRICES:

Gallon bottles, each, $1.75; 5 gal. lots, per gal., $1.60; 10-gal. lots, per gal., $1.50. Prices on barrel and half-barrel lots on application.

Be sure to specify "SYRUP Lime Juice and Kola" when ordering.

We supply attractive literature which will help you to create a demand. Write us about it.


SYRUP
LIME JUICE AND KOLA
Serve about one fluidounce of this syrup in an eight-ounce glass filled with plain soda-water. Draw solid and stir with a spoon.
PARKE, DAVIS & CO.
DETROIT, MICH. U.S.A.

PARKE, DAVIS & Co
HOME OFFICES AND LABORATORIES, DETROIT, MICH.

Pharmaceutical Review.

VOLUME 22. MAY, 1904. NUMBER 5.

Editorial.

The Chairman of the Historical Committee of the American Pharmaceutical Association has been informed that a photograph of the late **Charles Rice,** taken in Pittsburg, is in existence. He has also been requested to make an appeal for the loan of such a copy through the columns of this journal. It is to be hoped that those who know of such a photograph will spare no efforts to secure it in order that a copy may be taken and added to the Rice material that is now being collected. We know so little about the earlier history of Dr. Rice that every contribution, no matter how slight, will be especially valuable.*

It is very rare indeed that a professional or scientific journal has occasion to refer to "The Ladies Home Journal" or to a similar magazine. Let every druggist secure a copy of the May issue and read the timely article on **"The patent medicine curse."** The article is written for the information of women who would be "shocked if any one suggested that a drink of whiskey three times a day would make them feel better," but who dose themselves, their children and their unborn children as often daily with tonics compared with which beer and wine are not at all to be compared as far as possibilities for evil are concerned.

The article is also written for the special benefit of those religious papers whose advertising columns "fairly reek with the advertisements of these dangerous concoctions." Attention is called to the inconsistency of these papers in "advocating, with one hand, alcoholic prohibition, or temperance, and receiving, with the other hand, money for advertising—and thereby recommending to their readers—preparations filled ten times over with more alcohol than the beer which fills them with so much horror in their editorial columns!"

---

* Persons knowing of such a photograph will kindly notify the editor or Miss Adelaide Rudolph, 750 Republic St., Cleveland, Ohio, who is compiling the Rice material for the A. Ph. A.

This is not the place to comment on the accuracy of all the statements made by the author of the article. We need not agree with him in the statement that "It is not by any means putting the matter too strongly to say that the patent medicine habit is one of the gravest curses, with the most dangerous results, that is inflicting our American national life." Yet, no knowing person will deny that it is a curse and since the "patent medicines" are "sold by all druggists", were it not better if American druggists refused to act as liquor dealer in disguise?

One of our national associations is striving to secure the formulation of a satisfactory antinarcotic law, yet its provisions will not strike the greatest offender, the patent medicine manufacturer, who often, under disguise, first creates the habit. We denounce the druggist who stoops so low as to sell liquor to be drunk on the premises, but the very persons who on the hand, denounce their erring colleagues, on the other make an agreement with the manufacturer of "patent medicines" enabling them to be sole agents of the cursed nostrums.

The druggist secures a higher profit and the manufacturer the additional advertisement because of the greater respectability of the druggist over other venders of the stuff. Again the druggists unite to form cooperative organizations for the manufacture of ethical preparations, e. g. of household remedies, the contents of which are printed on the label, in order to combat the patent medicine evil. Yet the very same persons continue to sell the patent medicine and to advertise it.

No doubt, many a member of the Woman's Christian Temperence Union will be shocked when she reads the article referred to above. Let us hope that many a druggist may read it and likewise be shocked. The patent medicine traffic is based almost entirely on ignorance and greed. Let the druggist who has never "thought of it in this way" think about it and think seriously. It is a good sign of the times that life insurance companies are beginning to ask the question: "What patent medicines have you used during the last five years." This places them were the belong, namely with the curses of evil habits.

It is not to be expected that the members of the Woman's Christian Temperance Union will cease to use "patent medicines", that religious papers will refuse their advertisements, or that druggists will cease to sell them so long as they are freeley advertised and greatly demanded by an overcredulous public, but if the article referred to above causes people to think it will have done good service to mankind.

On more than one occasion the writer has advocated the affiliation of independent colleges with universities. We welcome, therefore, the **affiliation** which has been effected between the **College of Pharmacy of the City of New York** and **Columbia University,** for the union of the two institutions apparently promises to be something more than a mere affiliation in name only. If the union of these two institutions were the result merely of an extension of educational imperialism, swelling the roll of attendance of Columbia and obligating the N. C. P. "boys" to yell for the Columbia foot ball team or crew we might well regret even the partial loss of individuality of one of our oldest pharmaceutical institutions of learning.

That the affiliation is to mean more has repeatedly been stated: the medical students of Columbia are to enjoy certain privileges in the laboratories of the N. C. P. while the pharmacy students are to be given equal privileges on Morningside Heights several miles away. While on the one hand these and other statements of like tenor have been proclaimed to the pharmaceutical world by the trade press, on the other hand it has been pointed out that the College is not to lose its financial identity as it were. In other words, Columbia University is sufficiently in debt and has no desire to shoulder the debt of the N. C. P., but will leave the burden of financing the institution to its students and the druggists of New York City.

These remarks are not made in a critical mood, neither are they intended to detract an iota from the importance of the affiliation as far as accomplished. The writer, though without detailed information, has at least some appreciation of the difficulties that must have beset the authorities both of Columbia and of the New York College to get together on any working basis whatever. There is, however, a sufficient reason for pointing out a few things of which little or nothing has been said in the numerous journals that have recounted the celebration of the affiliation of one of the oldest colleges of pharmacy with one of the oldest general institutions of learning. These remarks would not have been proper at the celebration, but they should be made before the interest in so important an event has vaned.

The very fact that the New York College of Pharmacy is one of the oldest as well as of the largest institutions of its kind makes the event doubly important. Now that it has broken, at least in part, with its traditions, other institutions may consider the advisability of following its lead. The tendency in educational matters, like in most others, is toward more effective union and greater economy. That the old colleges of pharmacy are beginning to be influenced by the general movement is clearly shown by the partial affiliation in New York.

The lesson which the nature of the affiliation effected should teach us is the relatively low status of pharmaceutical education generally in this country. The university schools and departments, wherever these departments have been an integral part of the university system, have felt this from the very beginning. Although they demanded more stringent requirements for admission, a longer period of attendance, and longer hours of attendance during the academic year, some of these requirements compared none too well with the corresponding requirements of the socalled regular courses, i. e. the four year courses leading to a bachelor's degree. The unsatisfactory position has been remedied in part by the establishment of a four years' course on a like basis with other four years' courses at the same institutions; but only in part, for the older, shorter and less exacting course had to be continued as a matter of necessity.

The dean of one of the older colleges of pharmacy is reported to have advised a colleague not to accept a position at a university because of this unfavorable comparison. Yet in as much as all these matters are relative, it is by comparison that we stand or fall. The *mene, mene tekel upharsin* applies not to absolute, but to relative standards. It is this comparison that the course or courses of the New York College of Pharmacy are now being submitted to. It is true that such a comparison has always been possible and has occasionally been made by the more careful and critical observers. But the conclusions were heeded but little. Now they can scarcely be avoided although care seems to have been taken by reporters not to make them too prominent.

According to journal reports, the Ph. G. course of the N. C. P. is not included in the affiliation. Columbia University recognizes only those courses to the admission of which certain entrance requirements are demanded. While we are told that the seal of Columbia University is to give added dignity and value to the diploma of the N. C. P., the majority of its graduates evidently do not come within this scope. Thus is emphasized the fact that the oldest and largest colleges of pharmacy are to-day admitting students without entrance requirements of any kind. While the requirements demanded by the universities are altogether too low, some of the largest colleges have kept down this minimum requirement by demanding none whatever. Here lies the root of the evil of all of our shortcomings in pharmaceutical education.

Everyone who is at all acquainted with the conditions knows full well their cause. We trust that our older colleges of pharmacy may not only become affiliated with the larger universities of the east, but that, like the latter, they may become endowed with sufficient funds so as to become independent, in part at least, of students fees. Then, and then only, can they fully meet their obligations to the cause of pharmaceutical education in so far as the colleges and schools have any controll over them.

Already we are promised that such steps are to be taken in the future. It is at this point where the affiliation with Columbia will bring about the greatest good. The first step taken, others must follow. The American Conference of Pharmaceutical Faculties is anxiously awaiting the day when such a step will have been taken by one of the oldest and largest colleges of pharmacy. A topic which the Conference thus far did not dare to discuss will then come up for consideration. A minimum requirement can then be adopted and this minimum, being more odious by comparison than no requirement at all, will have to be increased as rapidly as possible. If to such a requirement, graduation from a reputable college or its equivalent can be demanded as a pre-requisite to state board examinations, pharmaceutical education and the practice of pharmacy in America will have entered upon a new era.

For some years New York has been trying to secure such a prerequisite clause as an amendement to its pharmacy law. Should this pass,* the New York College ought to see its way to the abolition of a course with no enterance requirements. What such an example would mean to this country can scarcely be estimated.

---

* As we go to press, a letter from New York announces the passage of the prerequisite clause by the legislature.

That these views are not out of harmony with the ideals of President Butler of Columbia University becomes apparent from the following remarks made by him:

> The incorporation of the College of Pharmacy of the City of New York in Columbia University is an important step both for the University and for the College of Pharmacy. For the University it means the inclusion of one more profession resting upon a scientific foundation within the scope of the university ideals and university influence; for the College of Pharmacy it means an intellectual association and coöperation of the greatest value, and an opportunity to elevate its standards and enrich its course of instruction under university auspices and university guidance. It is obvious that one of the first steps to be taken must be the raising, as rapidly as possible, of the requirements for admission to the College of Pharmacy, in order that no professional student of the university shall lack the solid foundation afforded by a good general education. A second step will naturally be the enrichment and development of the programme of studies in such a way as to attract to the college an increasing number of the best equipped students of pharmacy from all parts of the United States. The New York College of Pharmacy should become, in effect, so far as its relation to other schools of pharmacy is concerned, an advanced or graduate institution, to which those who hold degrees from other schools of pharmacy will gladly come in order further to prosecute their studies and to be led into the field of investigation and research. It is also certain that the College of Pharmacy will be touched by the spirit of research which prevails throughout the university, and that its faculty will more and more take on the qualities and the characteristics of an investigating, as well as teaching, body.

The intent and purpose of these remarks was not to find fault with the New York College of Pharmacy as to its past, for it has done excellent work; nor with the present partial affiliation, for, as stated above, no one can welcome it more than the writer; but to emphasize the lessons which the character of the affiliation should teach us. It is only by keeping these clearly and constantly before us that we may expect to see the best results come from this important step. May it not only benefit the New York College of Pharmacy, but pharmaceutical education throughout the United States.

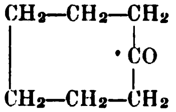
Progress in Alkaloidal Chemistry During the Year of 1903.

By *H. M. Gordin.*

The complete synthesis of **atropine, atropamine, belladonine** and **d-cocaine** has been effected by R. Willstätter. As hyoscyamine is, according to Gadamer, (Arch. Pharm. 239, 302) the ester of inactive tropine and l-tropic acid the synthesis of this alkaloid has also become a possibility of the near future.

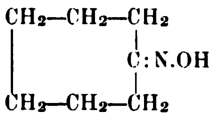
It has been known for some years that atropine can be partly synthesized from tropic acid and tropine, the two substances into which atropine breaks up when saponified. As tropic acid can be made synthetically it lacked only for the complete synthesis of atropine a synthetic method for tropine which had been obtained only from atropine or hyoscyamine. Willstätter succeeded in making tropine synthetically. From tropine all the above mentioned alkaloids can then be synthesized.

Willstätter started from suberone or cycloheptanone

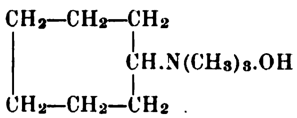


As suberone can be obtained by heating calcium suberate and suberic acid can be made synthetically by electrolyzing the potassium salt of ethyl glutaric acid, suberone is accessible synthetically.

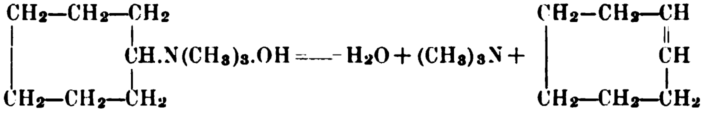
The suberone is converted by means of hydroxylamine into an oxime



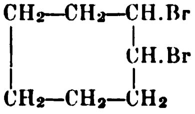
the oxime by reduction gives an amine which by the method of exhaustive methylation is converted into cycloheptane-trimethylammonium hydroxide



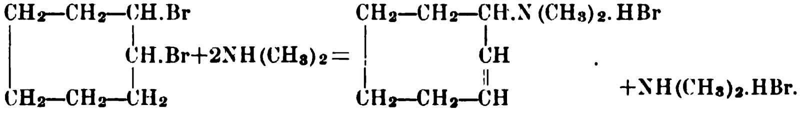
The ammonium base easily breaks up into water, trimethylamine and cycloheptene



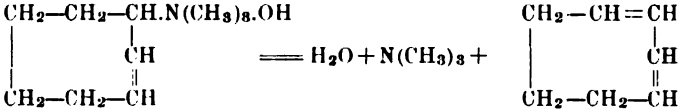
Upon treating cycloheptene with bromine cycloheptene bromide is formed



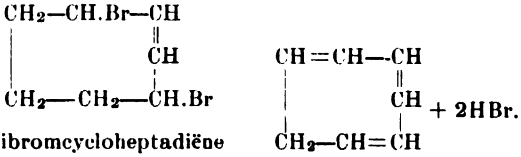
and by treating the bromide with dimethylamine in benzol solution dimethylamino-cycloheptene-hydrobromide is obtained.



The dimethylamino-cycloheptene easily combines with one molecule of methyl iodide and the compound thus obtained after converting it into the corresponding ammonium base is changed by distillation into cycloheptadiëne



When brominated in chloroformic solution the cycloheptadiëne is converted into cycloheptadiëne dibromide which when heated with quinoline to 150—165° C loses hydrobromic acid and is transformed into cycloheptatriëne or tropilidene



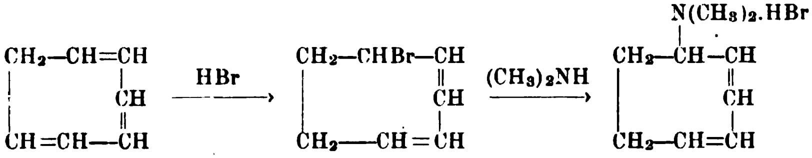
Dibromcycloheptadiëne

Cycloheptatriëne or Tropilidene.

This tropilidene was found to be identical with the compound obtainable from atropine.

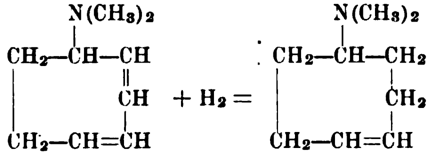
The next step in the synthesis of atropine was the conversion of tropilidene into tropidine.

For this purpose the tropilidene was treated with hydrobromic acid to obtain hydrobromtropilidene which when treated with dimethylamine was converted into dimethylamino-cycloheptadiëne hydrobromide or so called α-methyltropidine hydrobromide.



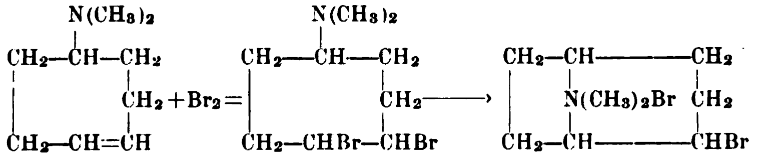
Tropilidene Hydrobrom-tropilidene α-methyl-tropidine hydrobromide

By means of nascent hydrogen α-methyl-tropidine is converted into Δ^4-methyltropane



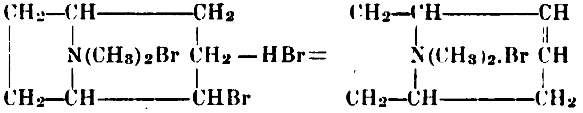
Δ^4-methyltropane.

The Δ^4-methyltropane in acid solution takes up two atoms of bromine and upon warming the dibromide so obtained it is quickly transformed by an intramolecular change into brom-tropane-methyl-ammonium bromide in which the nitrogen atom is linked to two atoms of carbon forming a double pyrrolidine and reduced pyridine ring.



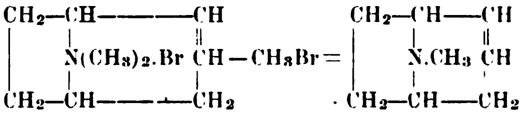
Brom-tropane-methyl-ammonium-bromide.

This ammonium base when treated with alkali loses hydrobromic acid and is converted into the corresponding ammonium base of tropidine.



Tropidine-methyl-ammonium-bromide.

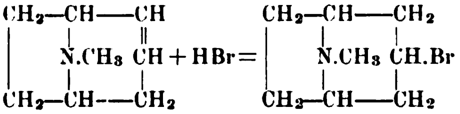
The latter ammonium base when subjected to dry-distillation loses methylbromide and gives synthetical tropidine in every respect identical with the tropidine obtained from tropine.



Tropidine.

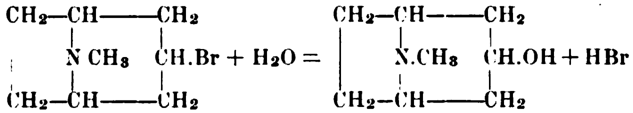
The last step in the synthesis of atropine is the conversion of tropidine into Ψ-tropine, isomeric with tropine, and the transformation of Ψ-tropine into tropine.

When heated with hydrobromic acid in acetic acid solution tropidine takes up one molecule of hydrobromic acid forming monobromtropane.



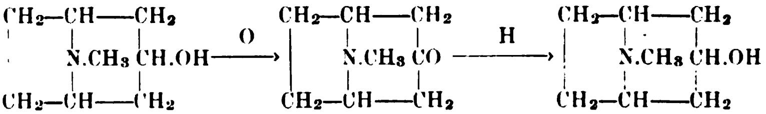
Monobrom-tropane.

On heating the monobromtropane with dilute acid under pressure it is converted into Ψ-tropine.



Ψ-tropine.

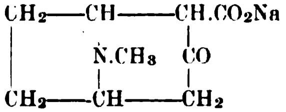
In order to convert Ψ-tropine into tropine the Ψ-tropine is oxidized to tropinone which by reduction gives back tropine instead of Ψ-tropine.



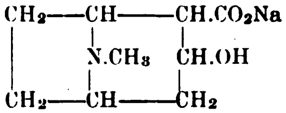
Ψ-tropine. Tropinone. Tropine.

By combining the alcohol tropine with tropic acid to an ester atropine can be made and by using atropic acid instead of tropic acid apo-atropine is obtained. The apo-atropine is easily changed into belladonnine by means of moderately strong hydrochloric acid.

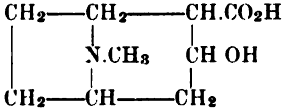
The synthesis of d-cocaine which differs from the natural cocaine only with regard to optical rotation was effected by Willstätter by treating tropinone, the ketone corresponding to tropine, with sodium and carbon dioxide. The sodium salt of tropinone carboxylic acid



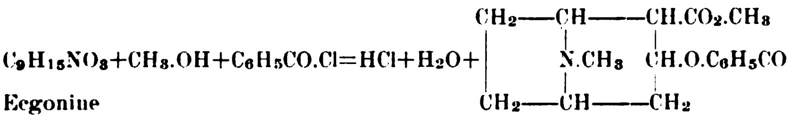
thus obtained, upon reduction by means of sodium amalgam in slightly acid solution, gave the corresponding sodium salt of tropine carboxylic acid



from which acids liberated tropine carboxylic acid or d-ecgonine



By means of methyl alcohol and benzoyl chloride the d-ecgonine is convertet into d-cocaine in the same way as l-cocaine is obtained from l-ecgonine



$C_9H_{15}NO_3+CH_3.OH+C_6H_5CO.Cl=HCl+H_2O+$

Ecgonine

Cocaine.

(Ann. Chem. Pharm. 326. 1.)

According to G. Eigel it is possible to distinguish between the hydrochlorides of **cocaine,** α-Eucaine and β-Eucaine by means of the following reactions: If to one drop of a one per cent solution of these hydrochlorides a five per cent solution of mercuric chloride be added, no precipitate is obtained from β-eucaine; cocaine and α-eucaine both give a precipitate.

To distinguish between the latter two add to one drop of the one per cent solution a ten per cent solution of potassium iodide. Cocaine gives no precipitate, α-eucaine gives a crystalline precipitate.

Ten c. c. of a solution (1 in 1000) of the hydrochlorides of cocaine and β-eucaine give no precipitate upon the addition of one drop of aqueous ammonia; α-eucaine gives a white precipitate.

(Apoth. Ztg. 18, 603.)

Morphine acid tartrate $C_{17}H_{19}NO_3.C_4H_6O_6$ was obtained by A. E. Tanner by treating the neutral tratrate with tartaric acid using equivalent quantities of the alkaloid and the acid.

(Pharm. J. [4], 16, 134.)

C. Reichard gives some new color reactions of morphine. On warming morphine with two or three c. c. of a colorless solution (0.1%) of ammonium vanadate in sulphuric acid a permanent light green color is produced. In dilute solutions the color is bluish-green,

With a solution of sodium tungstate (0.1%), after acidulating with hydrochloric or sulphuric acid, an unstable light blue or violet color is obtained.

Solutions of potassium dichromate (0.1%) acidulated with sulphuric acid are colored by morphine light green. The reduction color is very stable.

If to a solution of titanic acid in sulphuric acid a salt of morphine be added a black color is formed around the salt. On shaking, the liquid assumes a blood-red color which disappears upon the addition of water. (Zeitschr. Anal. Chem. 41, 95.)

Ach and Knorr obtained from **codeine** two oxidation products: oxycodeine and codeinone. Oxycodeine is formed by oxidizing codeine with chromic acid in presence of sulphuric acid when the temperature is kept between 5 to 10° C.

The formula of oxycodeine is $C_{18}H_{21}NO_4$ and it is formed according to following equation:

$$C_{18}H_{21}NO_3 + O = C_{18}H_{21}NO_4.$$

It differs from codeine in having a higher melting point (207—208° C.) and giving a red color with sulphuric acid.

Boiling acetic anhydride converts it into diacetyl oxycodeine showing the presence of two alcoholic OH-groups. In alcoholic solution it combines with one molecule of methyl iodide giving a compound which crystallizes with half a molecule of $C_2H_5.OH$.

The diacetyl oxycodeine also combines with one molecule of methyl iodide forming a compound which is decomposed at 248—255° C.

The other oxidation product of codeine, codeinone, is formed when codeine is oxidized by potassium permanganate in acetone solution or by chromic acid mixture when the temperature is not kept down to 5—10° C.

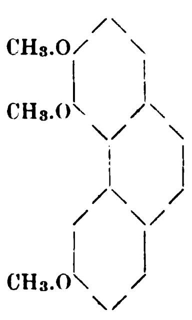
The formula of codeinone is $C_{18}H_{19}NO_3$ and it is formed according to the following equation:

$$C_{18}H_{21}NO_8 + O = C_{18}H_{21}NO_8 + H_2O.$$

Its relation to codeine is that of ketone to the corresponding secondary alcohol. It melts at 185—186° C. Its surface assumes a rose-red color on exposure to light. It is less soluble in most solvents than codeine and is more levo-rotatory. It forms a hydrochloride, a picrate and a picrolonate. Codeinone produces reddening and swelling of the skin when brought in contact with it. It forms an oxime which crystallizes with one molecule of $C_2H_5.OH$ and melts at 212° C. With one molecule of methyl iodide it forms a compound crystallizing with two molecules of H_2O.

(Ber. deutsch. chem. Gesell. 36, 3067.)

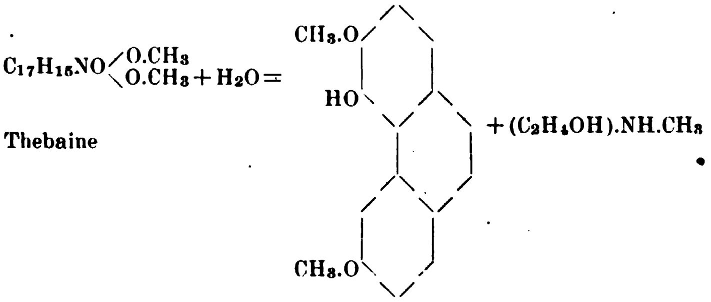
On heating codeinone (see preceeding paragraph) with five times its amount of acetic anhydride Knorr obtained methyl-diacetyl-trioxy-phenanthrene. On replacing the acetyl by methyl groups trimethyl-trioxy-phenanthrene was obtained, identical with methyl-thebaol (thebaol being the dimethyl ether of trioxy-phenanthrene) which had been obtained by Vongerichten (Ber. deutsch. chem. Gesell. 33, 1824) from thebaine and the constitution of which had been established by the synthesis of the compound by Pschorr (ib. 35, 4407).



Methyl-theboal or trimethyl-trioxy-phenanthrene.

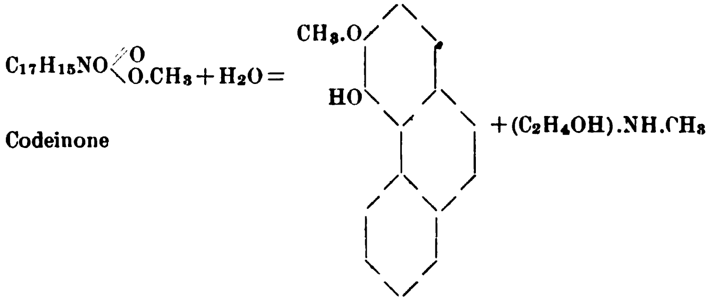
On boiling codeinone with dilute aqueous hydrochloric acid thebenine hydrochloride, $C_{18}H_{19}NO_3.HCl$ was formed identical with the thebenine hydrochloride obtainable from thebaine. On using a solution of hydrochloric acid gas in methyl alcohol methebenine hydrochloride was formed, again identical with the compound previously obtained by Freund (ib. 32, 179) from thebaine under the same conditions.

In the decomposition of codeinone by means of acetic anhydride there was also formed oxy-ethyl-methylamine which is also formed from thebaine when treated in the same way. The decomposition of codeinone is therefore very similar to that of thebaine. In both cases the reaction can be represented as follows:



$$C_{17}H_{15}NO\begin{matrix}/O.CH_3\\ \backslash O.CH_3\end{matrix}+H_2O= \quad + (C_2H_4OH).NH.CH_3$$

Thebaine

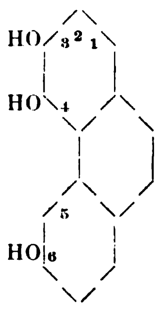


$$C_{17}H_{15}NO\begin{matrix}/\!/O\\ \backslash O.CH_3\end{matrix}+H_2O= \quad + (C_2H_4OH).NH.CH_3$$

Codeinone

Comparing these results with those obtained from thebaine and methyl morphimethine (metho-codeine) Knorr comes to the following conclusions with regard to the constitution of morphine.

1. Morphine is a derivative of 3, 4, 6-trioxy-phenanthrene.



2. The O-atom in 4 is the "indifferent" oxygen to which the nitrogen containing part of the molecule is linked in the form of an ether.

3. The OH in 3 has a phenolic and the OH in 6 an alcoholic function.

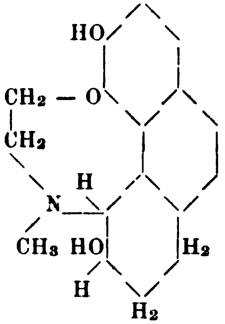
4. In the formation of morphol (dioxy-phenanthrene) the alcoholic OH is split off.

5. In the formation of thébenine the methoxyl in 6 is saponified to OH.

6. In the decomposition of thebaine and codeinone by means of acetic anhydride there are four OH groups formed: three in the trioxy-phenanthrene derivatives and one in the oxy-ethylmethylamine.

7. Thebaine is the methyl ether of the enolic form of codeinone.

For morphine the following formula is proposed:

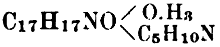


This formula does not account, however, for the existence of four methyl morphimethines (ib. 35, 3010) which would require the presence of two assymetric carbon atoms in the morphine molecule.

(Ber. deutsch. chem. Gesell. 37, 3074.)

Apo-codeine is formed from codeine by the same method by which apo-morphine is formed from morphine. It is shown by Pschorr, Jackel and Fecht that the OH-groups present in morphine are still present in apo-morphine; hence in the conversion of morphine into apo-morphine the reaction does not consist merely in the removal of a molecule of water as it had been supposed, but in the elimination of the "indifferent" oxygen atom. It was reasonable to suppose that apo-codeine also still contains the OH-group present in codeine. E. Vongerichten and Fritz Müller show that this is not the case as brombenzoylchloride does not give a brombenzoyl derivative with apo-codeine, nor does the iodomethylate of apo-codeine, when treated with alkali, give a compound corresponding to methyl-morphimethine obtainable from codeine under the same conditions.

Hence apo-codeine is not a definite compound but a mixture of substances containing apo-morphine.

On heating chlorocodid, which was obtained by the action of phosphorus pentachloride upon codeine, with piperidine piperido-codid  $C_{17}H_{17}NO\left\langle\begin{matrix} O.H_3 \\ C_5H_{10}N \end{matrix}\right.$ was obtained in nearly theoretical amount. It crystallizes from methyl alcohol with one molecule of $CH_3.OH$ and after drying at 110° melts at 118°. It is a diacid base forming a hydrochloride with two molecules of HCl. With methyl iodide it gives a mono- and a di-iodomethylate.

On treating piperidocodid mono-iodomethylate with concentrated sodium hydrate piperido-methyl-morphimethine $C_{24}H_{32}N_2O_2$ was obtained. It was isolated in the form of a platinum salt. On heating the piperido-methyl-morphimethine with acetic anhydride to 180° a neutral oily substance was obtained not identical with acetyl-methyl-morphol (acetyl-methyl-dioxyphenanthrene). On combining the piperido-methyl-morphimethine with methyl iodide and treating the resulting piperido-methyl-morphimethine-methyl iodide with alcoholic potassium hydrate a phenol like substance was formed not identical with morphenol. As codeine itself gives morphol and morphenol derivatives under the above conditions we must conclude that the OH-group which is present in codeine but which is eliminated from the molecule in preparing the piperido derivatives from chlorocodid (in the latter the OH is replaced by Cl), is necessary for the formation of morphol and morphenol derivatives.

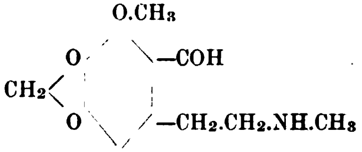
The above mentioned piperido-methyl-morphimethine which as said was obtained from mono-iodo-methylate of piperido-codid can also be obtained from the di-iodo-methylate of piperido-codid by the same method (treatment with alkali). The fact that both the mono- and the di-iodo-methylate of piperido-codid give one and the same compound when treated with alkali can possibly be explained by assuming that in the di-iodo-methylate of piperido-codid the methyl-iodide group attached to the piperidine nitrogen is split off without opening of the chain.

(Ber. Deutsch. chem. Gesell. 36, 1590.)

A. Wangerin finds that sodium sulphoantimonate added to a solution of **apo-morphine** containing no free alkali gives a precipitate with evolution of H_2S. The precipitate is white at first but soon becomes yellow. It is easily soluble in alkalies, ammonia and alkaline carbonates and assumes a golden yellow color when heated. The same is true of strychnine (see Palm, Zeit. anal. Chem. 22, 224).

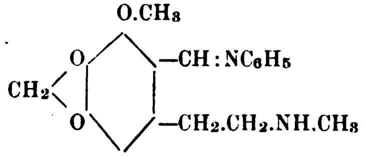
(Pharm. Ztg. 48, 914.)

Martin Freund and Franz Becker have investigated the constitution of **cotarnine.** Of the several formulas proposed for this base Roser favors the following:



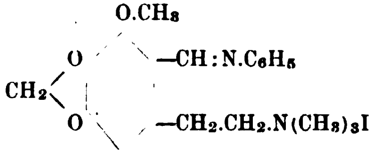
Cotarnine.

In order to determine the relative positions of the CH_3O and $CH_2:O_2$ groups cotarnine was converted by means of aniline into cotarnine-anil



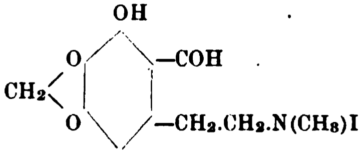
Cotranine-anil.

and the latter combined with methyl iodide to the anil of cotarnine methin-methyl iodide



Anil of cotarnine-methin-methyl iodide.

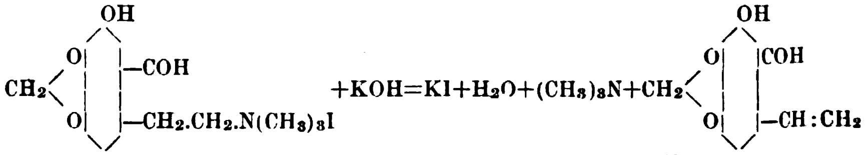
When this compound was treated with an excess of methyl-iodide and the resulting product treated with acids (to decompose the anil) nor-cotarnine-methin-methyl iodide was obtained under the replacement of CH_3 in the CH_3O group by H and formation of methylaniline



Nor-cotarnine-methin-methyl iodide.

On subjecting the anils of ortho-, meta- and para-methoxy-benzoic aldehyde to the action of an excess of methyl iodide it was found that this peculiar elimination of CH_3 from a CH_3O-group by means of methyl iodide occurs only with the ortho-methoxy-aldehyde, not with the meta or para compound. Hence the CH_3O and the COH groups in contarnine must be in the ortho position to each other.

Again when the nor-cotarnine-methin-methyl iodide is warmed with alkali it breaks up into trimethylamine and the alkaline salt of nor-cotarnone:



Nor-cotarnone.

This nor-cotarnone gives a violet color with ferric chloride and forms an intensely yellow sodium salt — two reactions that are characteristic of the derivatives of ortho-oxybenzaldehyde.

As **narcotine** is related to cotarnine in the same way as hydrastine is related to hydrastinine the constitution of narcotine can also be considered as settled, the constitution of hydrastinine being known:

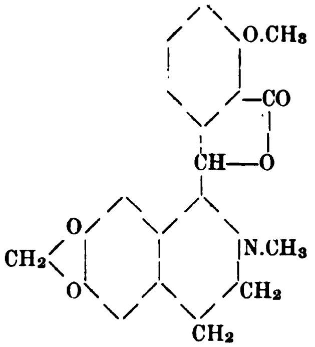
$$C_{21}H_{21}NO_6 + H_2O + O = C_{10}H_{10}O_5 + C_{11}H_{13}NO_3$$

Hydrastine. Opianic acid. Hydrastinine.

$$C_{21}H_{20}(CH_3O)NO_6 + H_2O + O = C_{10}H_{10}O_5 + C_{11}H_{12}(CH_3O)NO_3$$

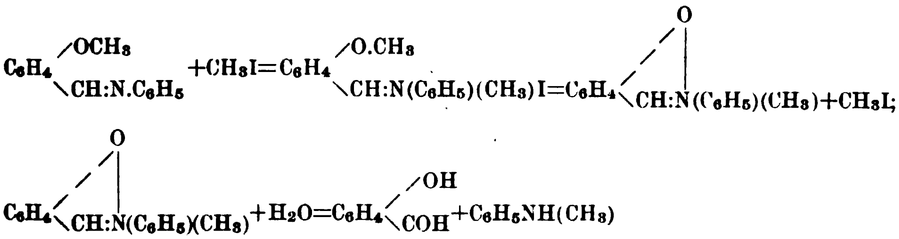
Narcotine or methoxy-hydrastine. Opianic acid. Cotarnine or methoxy-hydrastinine.

The constitution of narcotine in analogy with hydrastine is therefore:



Narcotine.

The elimination of CH₃ from the CH₃O-group of the anils of ortho-methoxybenzaldehyde by means of methyl iodide probably takes place according the following scheme:



$$C_6H_4\begin{matrix}/OCH_3\\ \backslash CH:N.C_6H_5\end{matrix} + CH_3I = C_6H_4\begin{matrix}/O.CH_3\\ \backslash CH:N(C_6H_5)(CH_3)I\end{matrix} = C_6H_4\begin{matrix}/O\\ \backslash CH:N(C_6H_5)(CH_3)\end{matrix} + CH_3I;$$

$$C_6H_4\begin{matrix}/O\\ \backslash CH:N(C_6H_5)(CH_3)\end{matrix} + H_2O = C_6H_4\begin{matrix}/OH\\ \backslash COH\end{matrix} + C_6H_5NH(CH_3)$$

Cotarnine anil was obtained in almost theoretical quantity by rubbing up together cotarnine and aniline. It is insoluble in water and crystallizes from ether, benzol or alcohol in fine needles melting at 124° with decomposition. It is not affected by alkalies; acids break it up into its component parts.

Cotarnine-para-ethoxy-anil $(C_{12}H_8NO_6):N.C_6H_4(O.C_2H_5)$ was obtained in the same way by using para-phenetidine instead of aniline. It melts at 120°.

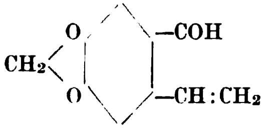
Cotarnine-anil-para-ethyl carbonate was also obtained in the same way from cotarnine and para-amido-ethylbenzoate. It melts at 147°.

The above mentioned anil of cotarnine-methin-methyl iodide (see formula above) was made by boiling molecular quantities of cotarnine-anil and methyl iodide in benzol solution for about 10 minutes.

It forms yellowish crystals becoming lighter on recrystallization from water and melting at 199°. It is insoluble in cold water. Acids immediately decompose it into aniline and cotarnine-methin-methyl iodide.

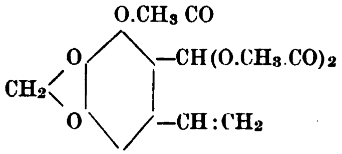
The nor-cotarnine-methin-methyl iodide (see formula above) was prepared by mixng equal parts of the anil of cotarnine-methin-methyl iodide and methyl iodide in a flask provided with a reflux condenser. It is soluble in boiling water and crystallizes in yellowish needles melting at 272°. Its alkaline salts dissolve in water with yellow color. When methylated with theoretical quantities of methyl iodide and sodium ethylate in alcoholic solution it is quantitatively reconverted into cotarnine-methin-methyl iodide.

Nor-cotarnone (formula given above) was made by boiling norcotarnine-methin-methyl iodide with sodium hydrate (30%). Considerable evolution of tri-methylamine took place and the liquid soon solidified to a mass of yellow crystals of the sodium salt of nor-cotarnone (Reactions given above). The latter was set free from the salt by acids. It forms greenish-yellow crystals melting at 89°. On methylating the potassium salt of nor-cotarnone with methyl iodide in alcoholic solution it was converted into cotarnone.



Cotarnone.

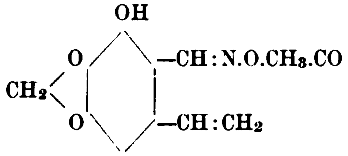
Nor cotarnone forms a triacetyl derivative when heated with acetic anhydride and sodium acetate.



Triacetyl-nor-cotarnone.

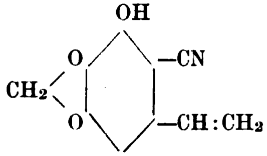
It is soluble in alcohol and benzol and melts at 125°.

With hydroxylamine nor-cortanone forms an oxime melting at 202—203°. When treated with acetic anhydride the oxime forms an acetate.



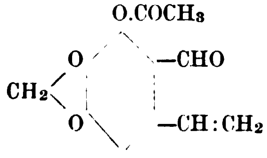
Nor-cotarnone-oxime-acetate.

That in this reaction the OH-group of the oxime group is acetylized, not the phenolic OH, is shown by the solubility of the compound in alkalies and by the fact that on heating it gives off acetic acid and is converted into nor-cotarnone-nitril.



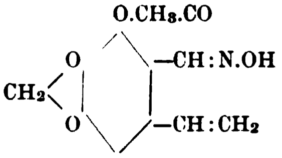
Nor-cotarnone-nitril.

On boiling this nitril with sodium carbonate a sodium salt was obtained. The free nitril melts at 202°. It gives an acetyl derivative melting at 110°. A monoacetyl-nor-cotarnone was prepared by treating the dry sodium salt of nor-cotarnone with acetic anhydride·



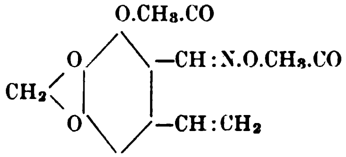
Mono-acetyl-nor-cotarnone.

It melts at 84—85°. This acetyl compound can be converted into an oxime which is isomeric with the above mentioned nor-cotarnone-oxime acetate.



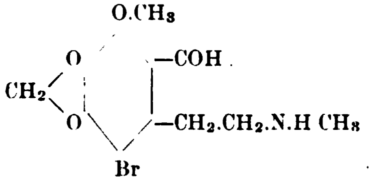
Acetyl-nor-cotarnone-oxime.

On treating the acetyl-nor-cotarnone-oxime with acetic anhydride a diacetyl derivative was obtained.



Diacetyl-nor-cotarnone-oxime.

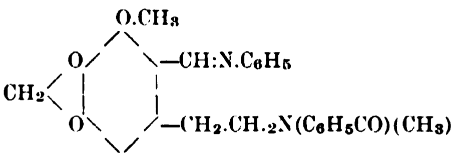
Compounds analogous to those obtained from cotarnine were also obtained from bromcotarnine by analogous methods.



Brom cotarnine.

Thus an anil melting at 127°, a methin-methyl iodide derivative melting at 264° with decomposition and a bromnor-cotarnone melting at 138° and giving a yellow sodium salt.

A benzoyl-cotarnine-anil was obtained by heating benzoyl-cotarnine with aniline. It melts at 165°.



Benzoyl-cotarnine-anil.

It is not affected by boiling methyl iodide. Heated with methyl iodide under pressure the anil was completely decomposed.

(Ber. Deutsch. chem. Gesell. 36, 1521.)

(*To be continued.*)

Phytochemical Notes.

By *E. Kremers.*

The writers' initiation into the realms of chemical research acquainted him at the same time with the charm that is associated with the application of chemistry to the study plant life. This charm has never deserted (?) him though at times the presence of other investigations and manifold duties compelled him to abandon phytochemical problems. That he has ever recurred to these problems becomes apparent, however, from the accompanying list of published notes, many of which are but fragmentary accounts.

The object of this compilation of titles is not so much to effect an inventory as it is to place in the hands of student investigators of this laboratory a convenient bibliography of work done here, and, last but not least, to point out to them the connecting thought that makes many of these notes the result of a deliberate plan rather than of a haphazzard seeking for new isolated facts.

This list does not include the titles of articles of purely chemical investigations of plant products, such as menthol and its derivatives, citronellal and its derivatives, abietic acid etc., some of which have grown out of phytochemical investigations.*

The first plant investigated was the white ash, a subject suggested by Professor Power for a graduation thesis. (No. 1.) The genetic relationship between *Fraxinus americana* from Wisconsin and the manna-yielding *F. ornus* from the Mediterranean suggested the examination of other species of *Fraxinus* that were available in this state. As a result *F. sambucifolia* and *F. viridis* were made subjects for graduation theses by students. (Nos. 20 & 21).) Whereas mannitol was found in some species, its stereochemical isomer, dulcitol, was found in others. The study of these species was not restricted, however, to the isolation of these hexatomic alcohols, but their closely related oxidation products, the sugars, and the glucosides were likewise investigated as far as time and material permitted. The study of the several species of *Fraxinus* promises to be fruitful of good results and should be continued, even though the collection of suitable material is difficult at times. See also Nos. 12 & 21.

---

* Neither are the earlier investigations of Professor F. B. Power nor more recent investigations of Professor R. Fischer on alkaloids included. The catalogue, therefore, is not one of phytochemical investigations of the School of Pharmacy of the University of Wisconsin, but one of the fragmentary notes published by the writer or by students working under his directions.

The writer's first experience with volatile oils was obtained in connection with the oils of pennyroyal (No. 2) and citronella (No. 3), both oils being investigated at the suggestion of Professor Power and under his direction during the academic year 1886—'87. The contribution of the two papers to the American Pharmaceutical Association at the Cincinnati meeting in 1887 caused him to join our national association at that time. The papers being read by Professor Lloyd, later brought the writer into touch with one who has done so much for the chemical study of American medicinal plants when few realized the importance of this subject or the opportunities in this large, uncultivated field. Even to-day this is largely virgin soil waiting for the pioneer investigator.

The first article on pennyroyal was followed by several others (Nos. 4, 5, 7, 15, 18) which, however, accomplished little more than to establish the presence of pulegone in this oil. The presence of pulegone was later established in two other oils of the mint family, namely: *Pycuanthemum lanceolatum* (Nos. 33 & 41) and *Mentha canadensis* (No. 40).

The initial study of citronella oil (No. 3) lead to further studies (No. 14), principally, however, of the aldehyde citronellal which are not enumerated in the list because they are not essentially phytochemical in character but purely chemical.

Thus initiated into the study of an exceedingly attractive group of plant products, the writer has spent more time on the volatile oils than on any other one subject. Among the oils first examined were some from the family of conifers: *Abies balsamea* (Canada balsam (Nos. 6, 26), *Pinus strobus* (leaves, No. 9), *Pinus palustris* (No. 28), *Picea nigra* (No. 29), *Pinus cubensis* (No. 30), *Tsuga canadensis* (No. 34), *Picea alba* (No. 43), *Pinus sabiniana* (No. 46). These investigations represent the study not only of oils obtained from the oleoresinous exudations, but also of oils from leaves and cones. Thus e. g. one of the leaf oils (hemlock) was found to be very rich in bornyl acetate.

The study of these species was not, however, restricted to their volatile constituents. The very first species enumerated above suggested the examination of the resin acids as well, which have long attracted the attention of chemists. As a result the resin acids from other species were included not only of natural products, but also of such that had undergone changes in the process of preparation (Nos. 6, 10, 11, 13). These phytochemical studies of the resin acids lead, likewise, to the purely chemical study of abietic acid (not enumerated[*] in which among other experiments the first molecular determinations of abietic acid were made as a contribution to the much controverted subject of the size of the molecule of this acid.

Attention has already been called to two local species of the mint family: *Pycnanthemum lanceolatum* (Nos. 33 & 31), and *Mentha canadensis* (No. 40), which have been examined in addition to pennyroyal, *Hedeoma pulegioides* (Nos. 2, 4, 5, 7, 15 & 18). Other labiate oils examined are those of spearmint, *Mentha viridis* (No. 17), peppermint oil, *Mentha piperita* (No. —) and the monarda oils.

The study of the Monardas was begun in 1895 with the examination of the oil of the local *Monarda fistulosa* (Nos. 27, 35, 37, 45, 48, 49, 52, 53). It was extended by including *M. punctata* (Nos. 36, 44 ∸ —) growing on the more sandy soil of Arena Co., west of Madison, and has thus far included *Monarda didyma* (No. 51) from the East and *Monarda citriodora* (No. 54) from the South. As rapidly as other material can be secured more species will be included within the scope of the investigation.

From its inception, the work on the Monardas was a chemical study in comparative plant physiology. As such it has proven exceedingly interesting. Not only, however, have the constituents of different species been compared, but the influence of cultivation and different seasons have been looked into. Moreover, and this is possibly the most important aspect of this study, the volatile constituents have not been studied merely by themselves, but in connection with the other constituents of the plants. Thus e. g. it has been shown that at least some of the pigments of the Monardas stand in direct relation to some of the volatile constituents, and that the ferments contained in the plant exert their influence on both (No. 55). In order to explain the different shades of color of the same pigment a study of the mineral constituents has been undertaken.

---

[*] Proc. A. Ph. A., 41, p. 198.

Here again as in previous instances, the initial study of plant products has lead to the purely chemical study of some of their constituents. Thus the derivatives of thymol and carvacrol, their oxidation to hydrothymoquinone and thymoquinone (all of which are found in Monarda oils) the subtle characteristics of the thymoquinhydrone had to be studied by themselves in order to be able to interpret properly the observations made in connection with the plants. Some of those investigations have been reported on, but are not included in the phytochemical list, others are still in progress.

Among other oils examined are those of *Canella alba* (No. 16, 15). *Erigeron canadense* (No. 22, 31), *Saw palmetto* (No. 47), *Pseudocymopterus anisatus* (No. 50). The occurrence of methyl salicylate in nature is discussed in No. 42; the absence of hydrocyanic acid in Mitchella repens is shown in No. 39.

Triticum repens (No. 23), Kava kava (No. 32) and Johore gambier (No. 38) were likewise investigated. The reasons for taking up these several subjects need not here be mentioned: some have grown out of other work, others were examined upon request etc.

The reference to methyl salicylate suggests calling attention to another piece of work that has grown out of the work on the volatile oils, but does not strictly come within the scope of these "Phytochemical Notes." Reference is here had to the classification of the volatile constituents of plants in accordance with rational principles of modern classification and a critical discussion of their occurrence in the vegetable kingdom. The publication of this work was begun several years ago, but had to be interrupted temporarily on account of U. S. P. revision duties.

The writer trusts that these brief remarks on work scattered over a period of eighteen years may throw some light on more than fifty fragmentary publications that must largely appear without connection or positive plan to the casual reader. Should the writer be permitted to continue this work, he hopes to be able some day of bringing into even closer relationship at least some of these many scattered results.

1886.

1. Edward Kremers. Analysis of the bark of Fraxinus americana Lin. Contributions from the Department of Pharmacy of the University of Wisconsin, No. 2, p. 19.

1887.

2. **Edward Kremers.** Analysis of the volatile oil of Hedeoma pulegioides. Proc. A. Ph. A., 35, p. 546.
3. —— Examination of the oil of Andropogon nardus. Proc. A. Ph. A., 35, p. 562.

1888.

4. **Edward Kremers.** Remarks of the analysis of the volatile oil of Hedeoma pulegeoides. Pharm. Rundschau, 6, p. 103.

1891.

5. **Gustave V. Kradwell.** Terebinthina canadensis, with a review of the different varieties of turpentines. Proc. Wis. Pharm. Assn., 12, p. 37.
6. **Edward Kremers.** The volatile oil of Hedeoma pulegioides. Persoon. Pharm. Rundschau, 9, p. 130.
7. **John L. Mead.** Examination of black pitch. Proc. Wis. Pharm. Assn., 12, p. 43.
8. **Walter A. Trayser.** Examination of the leaves of Pinus strobus, Lin. Proc. Wis. Pharm. Assn., 12, p. 41; also Ph. Rev., 7, p. 506.

1892.

9. **Otto Hackendahl.** Resin acid from black pitch. Proc. Wis. Pharm. Assoc., 13, p. 48.
10. **Wm. G. Kuntz.** Burgundy pitch. Proc. Wis. Pharm. Assoc., 13, p. 53.
11. **Rudolph H. Mieding.** Examination of the inner bark of Fraxinus americana, L. Proc. Wis. Pharm. Assn., 13, p. 80.
12. **Henry A. Peters.** Examination of the resin of Canada balsam. Proc. Wis. Pharm. Assn., 13, p. 45.
13. **Leopold C. Urban.** Citronellone. Proc. Wis. Pharm. Assn., 13, p. 61.
14. **William C. F. Witte.** Examination of Oleum hedeomæ. Proc. Wis. Pharm. Assn., 13. p. 55.

1893.

15. **Harold N. Bruun.** The volatile oil of Canella alba. Proc. Wis. Pharm. Assn., 13, p. 36.
16. **Walter F. Gilman.** The terpenes of spearmint oil. Proc. Wis. Pharm. Assn., 13, p. 53.

17. **Charles J. Habhegger.** On the composition of American pennyroyal oil. Proc. Wis. Pharm. Assn., 13, p. 51.
18. **Robert I. Halsey.** The hydrocarbons of peppermint oil. Proc. Wis. Pharm. Assn., 13, p. 88.
19. **Henry O. Hilfert.** Fraxinus viridis, Michx. (Green Ash.) Ph. Rund., 11, p. 215; also Proc. Wis. Pharm. Assn., 13, p. 63.
20. **Edward Kremers.** Dulcitol. Pharm. Rundschau, 11, p. 158.
21. **Fritz W. Meissner.** Oil of Erigeron canadense L. Proc. Wis. Pharm. Assn., 13, p. 65.
22. **Harriet R. Pope.** Chemical constituents of rhyzome of Triticum repens. Proc. Wis. Pharm. Assn., 13, p. 96.
23. **Willibald J. Wehle.** Fraxinus sambucifolia (Black Ash) Lam. Proc. Wis. Pharm. Assn., 13, p. 61.

1894.

24. **Robert T. Williams.** The volatile oil of Canella alba. Pharm. Rundschau, 12, p. 183.

1895.

25. **H. L. Emmerich.** The volatile oil from Canada balsam. Am. Journ. Pharm., 67, p. 135.
26. **E. Kremers.** On the chemical composition of the volatile oil from Monarda fistulosa, Linne. Pharm. Rundschau, 13, p. 207. (Brennan and Mead.).
27. —— Oleoresin from Pinus palustris. (Heald.)
28. —— Oil from Picea nigra. (Hunkel.)
29. —— Oleoresin from Pinus cubensis Gries. (Hunkel.)
30. —— Terpentineol from Oil of Erigeron canadense. (Hunkel). Pharm. Rundschau, 13, p. 35.

1896.

31. **Arthur E. Bossingham.** On the chemical composition of Kava Kava. Proc. W. P. A., 17, p. 53.
32. **Washington G. Correl.** Oil from Pycnanthemum lanceolatum Pursh. Ph. Rev., 14, p. 32.
33. **Carl G. Hunkel.** Oil from Tsuga canadensis Carriere. (Hemlock Oil.) Ph. Rev., 14, p. 34.
34. **Edward Kremers and E. J. Melzner.** On the chemical composition of the oil of Monarda fistulosa. Ph. Rev. 14, p. 198; also Proc. A. Ph. A., 44, p. 242.

35. —— and **W. R. Schuman.** On the chemical composition of the oil of Monarda punctata. Ph. Rev., 14, p. 223; also Proc. A. Ph. A., 44, p. 238.

1897.

36. —— and **E. J. Melzner.** Phenol content of the oil of Monarda fistulosa. Ph. Rev., 15, p. 86.

37. **William O. Richtman.** Johore gambier. Ph. Rev., 15, p. 27.

1898.

38. **Richard Fischer.** Test for hydrocyanic acid in Mitchella repens. Ph. Rev., 16, p. 98.

39. **Florence M. Gage.** Mentha canadensis. Ph. Rev., 16, p. 412.

40. **F. W. Alden.** Pycnanthemum lanceolatum. Ph. Rev., 16, p. 414.

41. **Edward Kremers** and **M. M. James.** On the occurrence of methyl salicylate. Ph. Rev., 16, p. 100.

1899.

42. **Edward Kremers.** Some coniferous volatile oils. I. Oil of white pine (with W. A Trayser. See 1891.). Ph. Rev., 17, p. 506.

43. —— Monarda punctata (with W. E. Henricks). Ph. Archives, 2, p. 73.

44. —— Monarda fistulosa (with I. W. Brandel). Ph. Archives, 2, p. 73.

1900.

45. **Edward Kremers.** Notes on coniferous oils. II. Oil from Pinus sabiniana. Ph. Rev., 18, p. 165.

46. **Oswald Schreiner.** Saw palmetta oil, Ph. Rev., 18, p. 217.

1901.

47. **Irvin W. Brandel** and **E. Kremers.** Thymoquinone in wild bergamot oil. Ph. Rev., 19, p. 200.

48. **Edward Kremers** and **I. W. Brandel.** Hydrothymoquinone in wild bergamot oil. Ph. Rev., 19, p. 244.

1902.

49. **Irvin W. Brandel.** The Volatile oil from Pseudocymopterus anisatus. Ph. Rev., 20, p. 218.

1903.

50. **Edward Kremers.** Oil of Monarda didyma. With I. W. Brandel. Ph. Rev., 21, p. 109.

51. —— Oil from the corolla of M. fistulosa. With J. J. Beck. Ph. Rev., 21, p. 109.
52. —— Oil from the leaves of M. fistulosa. With I. W. Brandel. Ph. Rev., 21, p. 109.

1904.

53. I. W. Brandel. The volatile oil from Monarda citriodora. Ph. Rev., 22, p. 153.

* * *

54. Oxydase from Monarda Fistulosa.

By *Frank Rabak.*

Several years ago thymoquinone[1] and hydrothymoquine[2] were found in the volatile oil of *Monarda fistulosa.* Their presence suggested the existence of thymoquinhydrone, a pigment, in the plant. The discussion of this pigment will be taken up later. For the present, attention may once more be called to the fact that the formation of this pigment from either of the components may be accounted for in several ways.

First, The direct reduction of thymoquinone to hydrothymoquinone in those parts of the plant in which the pigment occurs does not seem plausible. That the autoxidation of thymoquinone to something else, with the consequent reduction of another molecule of thymoquinone to hydrothymoquinone, is readily accomplished in the proper solvent without the aid of other agents than daylight and room temperature has been demonstrated in this laboratory and will be reported on in detail some time in the future.

Second, The oxidation of hydrothymoquinone to thymoquinone can be accomplished readily with chemical agents in the laboratory. In the presence of certain impurities, the nature of which has not yet been studied, this oxidation appears to take place spontaneously. The observation of this fact would have suggested the possible oxidation of hydrothymoquinone to thymoquinone by an organic ferment in the plant, had not the thought occured before. It certainly strengthened the desire to ascertain the presence or absence of a ferment in *Monarda* and, if present, to study its action on this diatomic phenol.

Owing to the pressure of other work this simple test was postponed from year to year. Last fall, however, the test was made with satisfactory results, which are to be described below.

---

[1] This Journal, Vol. 19, p. 200.
[2] Ibidum, p. 244.

The ferment was isolated, or rather its solution prepared, according to the directions of Loeb. Fresh leaves were ground to a pulp in a mortar and a small amount of water added. The mass was expressed and the liquid filtered. From the filtrate the ferment was precipitated by alcohol, collected on a filter, washed in alcohol and redissolved in water. The addition of a drop or two of tincture of guaiac to a few c. c. of this solution produced a deep blue color. With hydrogen peroxide the solution apparently gave no reaction. The alcoholic precipitate, however, gave an abundant reaction with hydrogen peroxide, thus indicating the presence of an insoluble oxydase as well.

Inasmuch as a knowledge of the ferments is obtained primarily by their action on other substances, a preliminary study of this ferment was undertaken in like manner. Its influence upon a number of substances was ascertained, first of all upon hydrothymoquinone.

Accordingly, 0.1 gm. of hydrothymoquinone was subjected to the oxidizing action of oxydase by allowing the hydrothymoquinone to stand together with 5 cc. of oxydase solution and 20 cc. of water in a wide mouth flask. After standing 43 hours the first change was noticed. Small black crystals appeared in the flask and continued to increase in quantity for a period of 48 hours more, at the end of which time no more black crystals seemed to appear. The mixture, however, was allowed to stand and further changes were observed. After standing for another day or more, small yellow crystals made their appearance and in one week from the time of their initia- appearance all the black crystals had been transformed into the yellow compound.

A duplicate experiment under like conditions but without oxydase solution was made and yielded negative results.

The hydrothymoquinone was evidently oxidized to thymoquinone As soon as formed, the latter combined with the former to thymoquinhydrone. The continuation of the oxidation caused the hydrothymoquinone component of the thymoquinhydrone to oxidize to thymoquinone, so that gradually the pigment disappeared and thymoquinone alone remained as the final product.

With hydroquinone similar results were obtained. In this case, however, the reaction was not allowed to run to the end, but was checked after an appreciable amount of quinhydrone had been found. This being more soluble than thymoquinhydrone and, therefore, not prone to form crystals, was shaken out with phenol, in which it is readily soluble with striking color.

0.1 gm. of hydroquinone, together with 20 cc. water and 5 cc. oxydase solution were allowed to stand. The solution gradually became darker in color until a red-brown color resulted. A slight black residue formed in the flask.

Hydroquinone alone in water acquired only a faint straw colored tint.

Some of the above red-brown solution was shaken with phenol which upon separation formed a red-brown layer. Practically all the color was taken up by the phenol the supernatent liquid being only faintly colored.

Inasmuch as the monatomic phenols, thymol and carvacrol, occur in the Monardas, the thought naturally presented itself to ascertain the influence of the oxydase on these two substances. No tangible results were obtained, the one with thymol appeared to be totally negative.

Cymene, the hydrocarbon underlying all of the above phenols, was next tried but also with negative results.

Thymoquinone being more closely related to the terpenes, at least as far as degree of saturation is concerned, limonene and pinene were tried. That changes took place here was quite apparent, but the amounts worked with were to small to arrive at any definite conclusion. These experiments are to be repeated next season if possible.

The presence of an oxydase in considerable amount having been demonstrated in a mint, the action of Monarda ferment on menthol was tried, but yielded negative results. Possibly the conditions were unfavorable. Since the influence of an oxydase on the volatile constituents of peppermint oil may be of the greatest importance to the peppermint oil industry, a further study of this phase is to be made as soon as time permits. Certain observations made on the Monarda appear to afford a rational explanation of changes observed by peppermint oil distillers in the herb when allowed to wilt before distillation.

The action of the oxydase on a number of other substances was likewise studied, e. g. on several hexoses and related compounds. An acid reaction was observed in several experiments, but inasmuch as no special precautions against organized ferments were taken, these experiments will have to be repeated with proper precautions.

The continuation of this work promises to be exceedingly interesting. Plant chemists as well as plant physiologists have too long studied artificial groups of plant constituents. The relationship between a socalled "indifferent substance", a voiatile oil, a pigment and a ferment of the same plant are indicated in this work and earlier phases of this work previously reported. The study of any one of these groups without reference to the others, while justifiable at times from a purely chemical point of view, when undertaken phytochemically is a serious mistake.

* * *

The Thermal "Death"-Point of the Monarda Ferments

By *D. B. Swingle.*

Loew, in his report on "Catalase, a new enzym of general occurrence," claims that the blue guaiac reaction is not brought about by soluble ferments in general, but that it is characteristic of a peculiar enzyme belonging to the oxydase group.* He also claims that the property of decomposing hydrogen peroxide, which is "generally ascribed to the various soluble ferments," is due to a distinct enzyme of general occurence.†

He further demonstrates, to his own satisfaction at least, that the power of catalysing hydrogen peroxide is not due to any of the previously known enzymes, hence he considers himself justified in ascribing this power to a special enzyme, which he calls catalase.‡

This catalase exists in two forms: an insoluble form designated as α-catalase, and a soluble form, the β-catalase. "The former is probably a compound of the soluble catalase with a nucleo-proteid, while the soluble catalase is an albumose and can be liberated by the action of very dilute alkaline media upon the insoluble catalase."§

"Numerous tests have established beyond a doubt that catalase is of general occurence in the vegetable kingdom. No living plant or vegetable organ tested was found free from it, some of the plants containing more of the soluble and others more of the insoluble form. Leaves from various families showed principally the insoluble catalase, in some cases only slight traces of the soluble kind being noticeable, while in various seeds the soluble kind was found present in large proportions."[*]

---

* U. S. Dept. of Agr. Report No. 68, p. 7.
† Ibidem, p. 8.
‡ do. p. 12.
§ do. p. 13.

He further shows that both α- and β-catalase have the power to oxidize hydroquinone,[†] but do not oxidize saligenin.

That the soluble ferment from Monarda oxidizes hydroquinone and hydrothymoquinone, has been shown by Rabak,[‡] also that it apparently does not oxidize compounds of the saligenin type. It would seem, therefore, that in this respect at least the soluble ferment of Monarda corresponds to the β-catalase of Loew.

In order to ascertain the thermal "death"-point of this ferment the following experiments were made.

The fresh leaves were triturated in a mortar with the addition of a small amount of distilled water. The pulp mixture was transferred to test tubes of small diameter and these heated in a drying oven for one-half hour. When taken out they were immediately cooled and tested with guaiac and with hydrogen peroxide.

70—71°. Upon the addition of hydrogen peroxide solution considerable oxygen evolved. Tincture of guaiac produced a decided blue color. Both tests, however, were not so marked as with the unheated leaf pulp.

74—75°. With H_2O_2 somewhat less oxygen evolved, with guaiac a very slight tint of blue was produced.

75—76.5°. With H_2O_2 but a few bubbles of oxygen resulted. With guaiac no blue color was visible after one hour, but a pale blue color appeared upon 20 hrs. standing.

76—77°. With H_2O_2 very few bubbles of oxygen resulted, with guaiac no blue color.

79—80.5°. With H_2O_2 only an occasional bubble resulted, with guaiac no blue color.

80—81° }
80—82° } No reaction with either reagent.

Loew states of the α-catalase that heating "for ten minutes to 60° C. did not decrease the intensity of the catalytic power, but heating for five minutes to 71° C. injured it considerably. After heating for five minutes to 75° C. and cooling quickly a faint trace of that power was still observed, but no trace was noticeable after heating for one minute to 80°."

Should time permit, a careful study, quantitative as well qualitative, of the ferments of *Monarda fistulosa* will be made next summer.

---

[*] Ibidem, p. 80.
[†] do. p. 89.
[‡] This journal, p. 190.

Volatile Oil Constituents of the Swedish and Belgian Pharmacopoeias.

The eight edition of the Swedish Pharmacopœia, which went into effect January 1, 1902, and the new Belgian Pharmacopœia contain a number of changes in the treatment of volatile oils which are worth noting.* Those to which attention is, herewith, directed pertain to the replacement of several volatile oils by certain of their constituents which are commonly regarded as essential. For the sake of a more ready comparison the treatment occorded the same substance by the two pharmacopœias is placed in opposition. The comments are those of the scientific editor of the Bericht of Schimmel & Co. from which the data are taken.*

ANETHOL.

Swedish.	**Belgian.**
$d_{25}° = 0.984$—0.986; $\alpha_D = \pm 0°$; melting point 20—21°; boiling point 233—234°; soluble in less than 2 parts of *Spir.*,[1] neutral reaction of the solution.	$d_{25}° = 0.984$—0.986; $\alpha_D = \pm 0°$; boiling point 232—234°; sparingly soluble in water, soluble in alcohol; freshly prepared anethol melts at 22° to a colorless, strongly refractive liquid.

BENZALDEHYDE.

	Produced from oil of bitter almonds or oil of cherry laurel, or synthetically. Colorless $d_{15} = 1.050$—1.055; $\alpha_D = \pm 0°$; boiling point 179°; sparingly soluble in water; soluble in every proportion in alcohol; when freshly produced it is neutral, but soon acquires an acid reaction on exposure to the air; test for absence of hydrocyanic acid, foreign oils, and nitrobenzene.

CARVONE.

$d_{15}° = 0.963$—0.966; $\alpha_D =$ to the right; boiling point 229—230°; soluble in *Spir.* in every proportion; soluble in 20 parts *Spir. ten.* A mixture of 1 cc. each carvone and *Spiritus*, must remain unchanged on the addition of one drop of dilute solution of ferric chloride, or at most show a faint reddish-violet tinge.	

---

* Comp. Semi-annual report of Schimmel & Co., Apr. 1902, p. 68; and Oct. 1903, p. 68.

[1] In testing the solubility, particular attention should in this case be paid to the temperature, as otherwise incorrect conclusions would be arrived at.

Swedish.

Belgian.

CINNAMIC ALDEHYDE.

Swedish.

$d_{15^\circ} = 1.054-1.056$; $\alpha_D = \pm 0^\circ$; boiling point at about 250°, with partial decomposition; soluble in *Spiritus* in every proportion.

Cinnamic aldehyde should solidify when the temperature is much reduced, and should melt again at 7.5°.[1] If a few drops of cinnamic aldehyde are mixed, whilst being cooled, with an equal number of drops of fuming nitric acid, the whole liquid congeals into a yellow crystalline mass, which dissolves in water under separation of yellow drops of oil.

Cinnamic aldehyde, as an aldehyde, separates metallic silver, and when heated is soluble in a solution of sodium bisulphite. The spirituous solution (1 + 50) should not be changed by one drop of ferric chloride solution.

Cinnamic aldehyde should give no chlorine reaction.

[1] The melting point lies not at + 7.5°, but at — 7.5°.

EUCALYPTOL.

Swedish.

$d_{15^\circ} = 0.928-0.930$; $\alpha_D = \pm 0^\circ$; boiling point 176—177°.

Soluble in *Spiritus* in every proportion. When reduced considerably in temperature, eucalyptol should congeal to a crystalline mass which again melts at — 1°.[1]

If some bromine vapor is introduced in a test tube of which the interior walls have been moistened with one or two drops of eucalyptol, numerous crystals of a faint yellow color should appear on the inside of the tube.

Belgian.

$d_{16^\circ} = 0.93$[2]; $\alpha_D = \pm 0^\circ$; boiling point 176—177°; almost insoluble in water, readily soluble in alcohol, ether and chloroform; makes a clear solution with an equal vol. *Paraffinum liquidum*; if some bromine vapor is introduced in a test tube of which the inside has been moistened with a few drops eucalyptol, fine red crystals should be formed; in a freezing mixture, at 1°, eucalyptol should solidify into long colorless needles[3]; on the water bath it should evaporate without weighable residue.

[1] The absence of congelation is not always a sign of a faulty preparation, as eucalyptol can often be cooled fairly much below the solidifying point without congealing; in such cases it is sufficient to add a small crystal of solid eucalyptol, when the whole mass will soon congeal.

[2] The specific gravity of pure eucalyptol lies between 0.928 and 0.980.

[3] The solidifying or melting point of eucalyptol does not lie at + 1°, but at — 1°; the solidification has sometimes to be brought about by the introduction of a small crystal of solid eucalyptol.

EUGENOL.

Swedish.	**Belgian.**
$d_{15}° = 1.072—1.074$[1]; $\alpha_D = \pm 0°$; boiling point 251—253°; soluble in *Spiritus* and ether in every proportion; soluble in 2 vol. *Spir. dil.* The strongly diluted spirituous solution is colored blue with ferric chloride. A mixture of eugenol and soda solution (25% NaOH) in equal volumes congeals to a solid crystalline mass.	Colorless or yellowish, becomes brown on exposure to the air. $d_{15}° = 1.072—1.074$; boiling point 251—252°[2]; sparingly soluble in water, readily in alcohol, ether, and glacial acetic acid. 1 gram eugenol makes a clear solution with 2 cc. caustic soda lye ($d_{15}° = 1.33$) and 28 cc. water, which gradually becomes cloudy when air is admitted. When shaking 5 drops eugenol with 10 cc. lime-water a flocculent precipitate should be formed; identity-reaction with ferric chloride, and test for carbolic acid.

---

[1] We have recently taken up the distillation of eugenol in vacuo, and thereby supply an absolutely anhydrous preparation. The remarkable occurrence has hereby been noticed that the eugenol becomes a little lighter ($d_{15}° = 1.0716$), but again increases in specific gravity ($d_{15}° = 1.0725$) when shaken up with water. This is probably due to an addition of water to the unsaturated side chain, as we have observed a similar occurrence also with other compounds having an unsaturated side chain.

We would further take the opportunity to point out that with the Westphal balance frequently used by chemists, it is not always possible to determine with exactitude the third decimal; in these balances an unequal division of temperature easily occurs, as the liquid can not be kept constantly moving, in consequence of which the thermometer, which serves at the same time as the sinking body, does not always indicate the exact average temperature of the whole liquid.

[2] For the boiling point the example of the German and Swedish Pharmacopœias should be followed: 251—253°.

MENTHOL.

Needle-shaped, colorless crystals; almost insoluble in alcohol, ether, and chloroform[1]; melting point 42° to 43°; boiling point 212°[2]; the solution of 0.1 gram menthol in 1 gram glacial acetic acid should not color when three drops sulphuric acid and one drop nitric acid are added; when evaporated on the water bath, 0.1 gram menthol should leave no weighable residue.

---

[1] This should clearly be: almost insoluble in water, readily soluble in alcohol, ether, and chloroform.

[2] The determination of the melting point would suffice for judging the menthol.

METHYL SALICYLATE.

Colorless; $d_{15}° = 1.1819$[1]; boiling point 220°; saponification number at least 360; sparingly soluble in water, soluble in alcohol and ether; identity-reaction with ferric chloride.

---

[1] The specific gravity of pure methyl salicylate lies a little higher, i. e. between 1.185 and 1.190 (15°).

Swedish. **Belgian.**

THYMOL.

Colorless, transparent crystals; very sparingly soluble in water, readily soluble in alcohol, ether, chloroform, and the aqueous solutions of caustic alkalies; heavier than water[1]; melting point 50—51°; boiling point 230°.

For the rest the test corresponds to that of the German Pharmacopœia.

---

[1] Molten thymol floats on water.

Pharmaceutical Legislation in New York During the Early Seventies.

Document 14.

[New York Times, August 14, 1871, p. ——, col. ——.]

The Druggist Question.

To the Editor of the New-York Times:

The letter of the Commissioners appointed to examine druggists, published in your issue of the 9th inst., conveys the idea that the opposition to the law under which said Commissioners were appointed and to their proceedings, is made only by those who are conscious of their incompetency and who fear examination. Nothing could be further from the truth. Many of the most intelligent and experienced druggists in the City are foremost in the opposition; men who are well capable of examining the examiners as far as regards scientific and practical knowledge of drugs. If this is doubted, a fair statement of the history, education, experience, present connections, social and political, of at least some of said examiners and many of the opposing druggists will make the fact apparent. This remark is made, not for the purpose of disparaging the Commissioners, but in answer to the unjust and unreasonable insinuation or allegation in their letter, that the opposition is to be attributed to conscious ignorance. The following are some of the objection to the law and to the proceedings under it:

The professional history of the examining board is greatly desired.

First—The druggists feel that the real object of those who projected and passed the law in uestion was to place a few offices in the gift of the Ring, and afford another opportunity for plunder. A somewhat prominent Democratic politician, and a member of the Legislature, which passed the law in question, told the writer, only a few days ago, that at the time the law was passed it was well understood that the real object of it was "to give a place to a few physicians whom the Ring wished to favor; that the pretense of benefiting the public was merely a pretext." The law itself—the manner of its execution—confirm this statement. Now, the druggists, as a class, object to being picked out specially to be plundered, or to have their rights to pursue their legitimate business subjected to the personal and political prejudices and interests of the Ring or their agents. If any druggist should be objectionable by reason of his political opinion, or if it should be convenient to some favorite of the Ring to have a competitor in the drug business disqualified and thrust out of the business, it is believed such person will easily be found incompetent and a certificate refused him. Some of the examiners are said to own one or more drug-stores. Many druggists who are not afraid of their examination are afraid of an unfair one. Such suspicions may be unfounded, but the Commissioners apopinted might well have been men above suspicion, had the Mayor been judicious in his selection. The pretext on which the law is based is false in fact. It has been assumed that the druggists of the City are incompetent to dispense drugs, and the Commissioners in their letter assert such to be the fact, and that the public "could not endure it longer." Such an assertion rests on no facts whatever. If a fair statement is made of all the accidents which have occurred in the City within the last five years from the giving or taking of drugs, it will be found that very few accidents or untoward results have occurred from the ignorance or incompetency of druggists. Such accidents are usually the results of carelessness on the part of some one rather than incompetency. If the mistakes of the physicians and the patients were fairly recorded and fairly stated, the druggists would be exonerated from much odium now unjustly and without reason cast on them. It is not intended to cast any reflection on the medical profession by this remark, but attention is called to the fact that by the laws of this State any person can practice medicine and write prescriptions. No diploma, no certificate, no medical education is required, and druggists are constantly called upon to put up prescriptions which perhaps the so-called regular medical faculty would consider objectionable. This law, then, affords no real safeguard to the public. There is no provision for pure drugs, no system or mode of dispensing them.

What charges of unfairness were brought against these men as individuals?

Second—It has no application to druggists outside of the City of New-York. It is an unjust discrimination against druggists in this City.

Third—It is unjustly and unfairly administered. It is made the occasion of levying a tax on druggists to which other citizens are not subjected. It was intended to be a means of raising a revenue for the benefit of the public at large, that would be so unjust as to afford ground for the most serious opposition. If by fair intendment it only authorizes the imposition of such fees as shall produce sufficient money to fairly pay the just expenses of the examination, then the Commissioners, with the assent of the Mayor, are administering the law unfairly, and perhaps, it may turn out, illegally. And for what purpose? Are we not justified in believing that all money improperly obtained by our present City officials is obtained for the mere purpose of plunder? By the law the Commissioners must examine all druggists now doing business in the City on application, within six months after their organization. After these have been examined there will be little for the Board to do. Each Commissioner and their Secretary is to receive not to exceed twenty-five hundred dollars per annum, during the pleasure of the Mayor. They meet two days a week for six months. Their salaries for the first year cannot exceed twelve thousand five hundred dollars. They ought not to exceed one-half that sum. It is said that a portion of the house or office of Dr. Doremus, one of the Commissioners, has been specially fitted up for their use. It is presumed that the City officials will pay good rent. Unconnected with the "Ring," Dr. Doremus, like Caesar's wife, might be above suspicion: yet the druggists have a right to look at this fact, in connection with the fee required of them, professedly to pay expenses. The necessary expenses, besides the salaries of the Commissioners and their Secretary, with a fair allowance for "picking and stealing," ought not to exceed tweny or twenty-five hundred dollars. The aggregate expense of the Commission, then, including full salaries, for one year, would amount to fifteen or sixteen thousand dollars. It ought not to exceed ten thousand dollars. It is to be remembered that one year is twice as long a time as the services of the Board are required to examine the druggists now doing business in the City. The fees imposed will produce from twenty to thirty thousand dollars at least. Thus a very considerable sum of money is to be raised over and above the expenses of the Commission if its members are honest, which the law requires to be paid into the public Treasury. The cost of a certificate to a clerk is ten dollars, to a proprietor thirty. In other words, a tax of twenty dollars is imposed on the proprietorship of a drug-store. That is in effect a tax on property without regard to value. The owner of a store worth one thousand dollars or less, with a trade of eight or ten dollars a day, must pay the same tax as the owner of a store worth ten or twenty thousand dollars, with a trade of several hundred dollars per day. And this is a tax on the property of druggists alone, and on property on which they besides have to pay the same general taxes as other citizens. Now the druggists justly ask, What is the object of this excessive tax, if it is not plunder? How are they benefited in return for their money? The Commissioners say in their letter, in effect, that they consider the price paid for the certificate the measure of the dignity conferred thereby. Do they mean that their standard of qualification for clerks and for proprietors is different? The fact is, that neither the druggist nor the community at large consider that any dignity attaches to, or goes with, any certificate thus issued. If the Mayor had been chiefly solicitous for the public good and the elevation of "the profession," would he not have ascertained the sense of leading druggists as to the composition of the Board of Examiners? And could he not have appointed a Board which would have commanded confidence, and which would have performed its duties without making "pay" its chief object, and without extorting unreasonable and unnecessary fees?

Saturday, Aug. 12, 1871. B. W.

What became of the fees paid to the Commission?

Can any one identify "B. W."?

"M. C. W." MORPHINE.

Our Morphine is unexcelled for purity, white and bulky. It may be had from all Jobbers at lowest prices and we invite our friends when ordering to

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,

ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,

ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street PHILADELPHIA
111 Fifth Avenue NEW YORK

—Die—

Deutsche Botanische Monatsschrift

beginnt demnächst ihren XX. Jahrgang. Sie kostet jährlich 6 Mark und sei allen Botanikern und Freunden der heimischen Flora bestens empfohlen.

Arnstadt, Thüringen.

Prof. Dr. G. Leimbach.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit	Regal Jockey Club
Italian Violette	Regal Crabapple
Boquet Carmen	Regal Peau d'Espagne
Boquet du Barry	Regal Lilac
Naiad's Breath	Regal Lilies of the Valley
Pearl of Persia	Regal Frangipanni
Psyche Rose	Regal Heleotrope
Regal Carnation	Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High Grade Guaranteed Bicycles.

New 1903 Models

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High Grade	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

Any other make or model you want at one-third usual price. Choice of any standard tires and best equipment on all our bicycles. *Strongest guarantee.*

We ***SHIP ON APPROVAL*** C. O. D. to any one *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels **$3 to $8**
taken in trade by our Chicago retail stores, all makes and models, good as new............

ESTABLISHED 12 YEARS

DO NOT BUY a bicycle until you have writen for our FACTORY PRICES AND FREE TRIAL OFFER.

Tires, equipment, sundries and sporting goods of all kinds, at half regular price, in our big free sundry catalog. Contains a world of useful information. Write for it.

J. L. MEAD CYCLE CO., Chicago, Ill.

Chicago College of Pharmacy.

THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF ILLINOIS.

The forty-fourth session begins September 29th, 1903. The course comprises two terms of seven months each and leads to the degree of Graduate in Pharmacy. Write for the announcement to...

W. B. DAY, ACTUARY,
465 STATE ST., CHICAGO.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

An amusing novel which had a widespread sale all over the country since its publication last fall.

THE LIGHTNING CONDUCTOR

The Strange Adventures of a Motor Car

EDITED BY

C. N. and A. M. WILLIAMSON.

The Nation says of this automobile love story: "We are only too well satisfied to go on with such delightful people, and especially through such delightful scenes. . . . This is old ground, but the unusual method of locomotion and a fresh touch give it a new and living interest. . . . A light, graceful, accurate mention devoted to some places and very satisfactory fulness to others. . . . The line of travel is among the châteaux of the Loire, to Bordeaux, a corner of Spain, Toulouse, Carcassonne, Marseilles, the French Riviera, the Italian Riviera, Pisa, Rome, Naples, Capri, and finally Taormina. It should be a good practical guide, too, to those about to go over the same course, while its charming descriptions of travel afford an ample new fund of pleasure, tinged with envy here and there, to the stay-at-homes." **PRICE $1.50.**

Timely Books.

CLEMENT. Handbook of modern Japan	Net	$1.40
GRIFFIN. The mikado's empire. 2 vols.		4.00
GULICK. Evolution of the Japanese	Net	2.00
BEVERIDGE Russian advance	Net	2.50
GERRARE. Greater Russia	Net	3.00
SKRINE. Expansion of Russia, 1815—1900	Net	1.50
HAMILTON. Korea. Illustrations and maps	Net	4.00
—— The same. New, cheap Edition	Net	1.50
HARTSHORNE. Japan and her people. 2 vols.	Net	4.00
STEAD. Japan of to-day	Net	2.00
NORMAN. All the Russias	Net	4.00
BISHOP. Korea and her neighbors		2.00

New and Forthcoming Books.

A little traitor to the South, by Cyrus Townsend Brady. (Macmillan)		$1.50
The man Roosevelt, a portrait sketch, by Francis E. Leupp. (Appleton)	Net	1.25
William Penn, by Aug. B. Buell. (Appleton)	Net	2.25
James Oglethorpe, by Harriet C. Cooper. (Appleton)	Net	1.00
The grave, a poem by Robert Blair, illustr. by 12 etchings. (Appleton)		1.50
The deliverance, by Ellen Glasgow. (Page & Co.)		1.50
Lux Crucis, a tale of the great appostle. by Sam. M. Gardenshire. (Harper Bros.)		1.50
The American prisoner, by Eden Phillpotts. (Macmillan)		1.50
The sign of triumph, by Sheppard Stevens. (Page & Co.)		1.50
The story of king Sylvain and queen Aimee, by Morg. Sherwood. (Macmillan)		1.50
The colonel's opera cloak, by Christine C. Brush. (Little, Brown & Co.)		1.50
Napoleon the First, a biography by Aug. Fournier. (Holt & Co.)	Net	2.00
Japanese physical training, by H. Irving Hancock. Illus. (Putnams)	Net	1.25
Bridge tactics, a complete self-instruction, by R. F. Foster. (Warne & Co.)		1.25
A history of modern England, by Herbert W. Paul. Vol. I and II (complete in 5 vols.) (Macmillan)	Net.	5.00
The crossing, by Winston Churchill. (Macmillan)		1.50
Daughters of Nijo, by Onoto Watanna. (Macmillan)		1.50
The faith of men, a volume of short stories, by Jack London. (Macmillan)		1.50
The people of the Abyss, by Jack London. New cheap Ed. (Macmillan)	Net	1.50
Life and teachings of Abbas Effendi, by Myron H. Phelps. (Putnam's Sons)	Net	1.40
Where American independence began. Quincy, its famous group of patriots, their deeds, homes and descendants, by Dan. Munro Wilson. Hought M. & Co.)	Net	2.25
Eighteenth Century essays on Shakespeare ed., by Nichol. Smith. (Macmillan Co.)	Net	3.00
A book of American humorous verse and a book of Am. prose-humor. 2 vols. (Stone & Co.) each		1.25
Electric traction, a practical hand-book on the application of electricity as a locomotive power, by John Hall Rider. Illus. (Macmillan)	Net	3.00
Man's place in the Universe, a study of the results of scientific research in relation to the unity or plurality of worlds, by Alfred R. Wallace. (McClure, Phillips & Co.)	Net	3.00
Peace and the vices, by Anna A. Rogers. (Scribner)		1.50
The history of American Music with some account of Music in America, by L. C. Elson,. (Macmillan)		
Whistler as I knew him, by Mortimer Wempes, with 100 full page plates in color. (Macmillan)..	Net	6 00
Her infinite variety is the spice of life, by Brand Whittock. (Bobbs Merrill Co.)		1.50
When wilderness was king, by Randall Parrish. (McClurg)		1.50
Robert Cavelter, a stirring romance of La Salle and the discovery of the Mississippi, by Wm. Dona Orutt. (McClurg)		1.50
The fugitive, Ezra S. Brudno. (Doubleday, Page & Co.)		1,50
Bred in the bone, by Thomas Nelson Page. (Scribners)		1.50
The Hermit and the wild woman, by Edith Wharton. (Scribners)		1.50
A volume of new stories, by Hy. Seton Merriman. (Scribners)		1.50
The past time of eternity, by Beatrix Demaress Lloyd. (Scribners)		1.50
My Friend Prospero. Henry Harland. (McClure, Phillips)		1.50
Mrs. McLerie. J. J. Bell. (Century Co.)		1.00
The close of the day. Frank M. Spearman. (Appleton)		1.25
A little garrison. Lieut. Bilse (Stokes)		1.50
Violett. Baroness von Hutten. (Houghton, Mufflin & Co.)		1.50
The adventures of Elizabeth in Rugen. MacMillan		1.50
Breaking into seciety, by George Ade. Harpers		1.00
A country interlude, by Hildegarde Hawthorne. Houghton, M.		1.25
The day of the dog, by Geo. Barr McCutcheon. Dodd		1.25
The Gordon elopement, by Carolyn Wells & Harry P. Tabor. Doubleday		1.25
The great adventurer, by Robt. Shackleton. Doubleday		1.50
Joan of the valley, by Orin F. Bartlett. Houghton		1.50
The horse-leech's daughters, by Margaret D. Jackson. Houghton		1.50
Henderson, by Rose E. Young. Houghton		1.25
Advanced Bridge: the higher principles of the game analyzed and explained, by J. B. Elwell. Scribners	Net	1.25

Just Published:

SIR MORTIMER by Mary Johnston.

Author of "To Have and To Hold".

A romance of Elizabethan days, of uncommon power and imaginative beauty. The love of the gallant Sir Mortimer for the fair Damaris Sedley, a lady of the court, runs like a poem through a narrative alive with stirring incidents of the days of Sir Walter Raleigh, when all England loved, sang, adventured and fought in the flush of youthful power. With frontispiece reproducing the colors of the original painting and eight other illustrations by F. C. Yohn, printed upon specially made India-tinted paper and mounted like photographs upon blank pages

PRICE $1.50.

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,

MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

Lanolin - Mercury

Represents a PERFECTED Mercurial Ointment. Its Lanolin base facilitates absorption and prevents rancidity.

ENCASED IN GELATINE CAPSULES, making it most handy for the patient, doctors will prefer this ointment for use in inunction cures to any other form.

Each gelatine capsule contains 3 grammes of the ointment, in either 33⅓% or 50% strength. By a tiny incision at the end of the capsule, its contents can be squeezed out and afterwards applied in the usual manner. The quantity to be administered can thus be definitely determined. If only for convenience and cleanliness alone,

Lanolin-Mercury Capsules

should be preferred to the ointment in bulk.

Lanolin-Mercury Capsules are supplied in boxes containing two dozen; either 33⅓% or 50% strength.

LEHN & FINK Manufacturing Chemists New York

FORMIN. Hexamethylene - tetramine Merck. Presents this idea urinary antiseptic in its highest obtainable purity. In powder form, o *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectant. Used the world over. Beware of imitations, which are poisonous and a the same time possess less disinfectant power. See that the signatur of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable tha the real virtues of cod-liver oil reside in an active principle or principles. Gaduol is the alcoholic extract of the active principles of cod-liver oil. It produces a stimulant and alterative effect on the processes of nutritio and absorption, and does not disturb the appetite or affect the stomach. A wine of cod-liver oil prepared from Gaduol is a favorite tonic and ha a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of man babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK.

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY

DR. FREDERICK HOFFMANN.

EDITED BY

DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

- Prof. J. H. **BEAL**, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
- Prof. **CHAS. CASPARI JR.**, Professor of Pharmacy, Maryland College of Pharmacy.
- Prof. **VIRGIL COBLENTZ**, Professor of Chemistry and Physics, New York College of Pharmacy.
- Dr. R. **FISCHER**, Assistant Professor of Practical Pharmacy, University of Wisconsin.
- Prof. H. **KRAEMER**, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
- Prof. J. U. **LLOYD**, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
- Dr. A. B. **LYONS**, Pharmaceutical Chemist, Detroit, Mich.
- Dr. F. B. **POWER**, Director of the Wellcome Research Laboratories, London, England.
- Prof. A. B. **PRESCOTT**, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
- Prof. W. A. **PUCKNER**, Professor of Chemistry, University of Illinois School of Pharmacy.
- Prof. J. O. **SCHLOTTERBECK**, Ph. D., Professor of Pharmacognosy, University of Michigan.
- Prof. **WM. SIMON**, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
- Prof. A. B. **STEVENS**, Professor of Pharmacy, University of Michigan.
- Dr. R. H. **TRUE**, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 6. JUNE, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, **$2.00.**
UNIVERSAL POSTAL UNION, **$2.50.**

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

The Nestor of Chicago Pharmacy. By *Albert E. Ebert* 201
Progress in alkaloidal chemistry during the year of 1903. By. *H. M. Gordin* 204
The proposed volatile oils of the U. S. P. 1900 By *E. Kremers* 214
Pharmaceutical legislation in New York during the early seventies 218
New Remedies, Organic and Inorganic 231
Books reviewed 233

Strong Claims

Adnephrin Solution is the **most active** and the **only permanent** solution of the adrenal active principle.

Without exception.

We would not make these claims unless we had ample proof of their truth. This proof consists of results obtained from oft-repeated and carefully performed comparative tests. It is indisputable.

And yet — though **by far** the best — Adnephrin Solution costs the druggist only

60 cents
an ounce

and every ounce sold pays some retail druggist a profit.

These are a few of the reasons why you should carry Adnephrin Solution in stock — **always:** none better could be offered.

All jobbers supply it in any quantity, from single ounces up.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

(Compound of stear-amide with hydrocarbons.)

Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 15% water.

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.

SHARP & DOHME'S
LAPACTIC PILLS
SEARCH OUT THE CAUSE
OF ATONIC DYSPEPSIA
OF CHRONIC CONSTIPATION
AND REMOVE IT
THEY NEVER GRIPE
THEY NEVER FAIL
NONE JUST AS GOOD
SHARP & DOHME
BALTIMORE
CHICAGO - NEW ORLEANS - ST. LOUIS
NEW YORK

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

... IS ALSO SUPPLIED IN ...

5-Grain Dose Powders

(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE

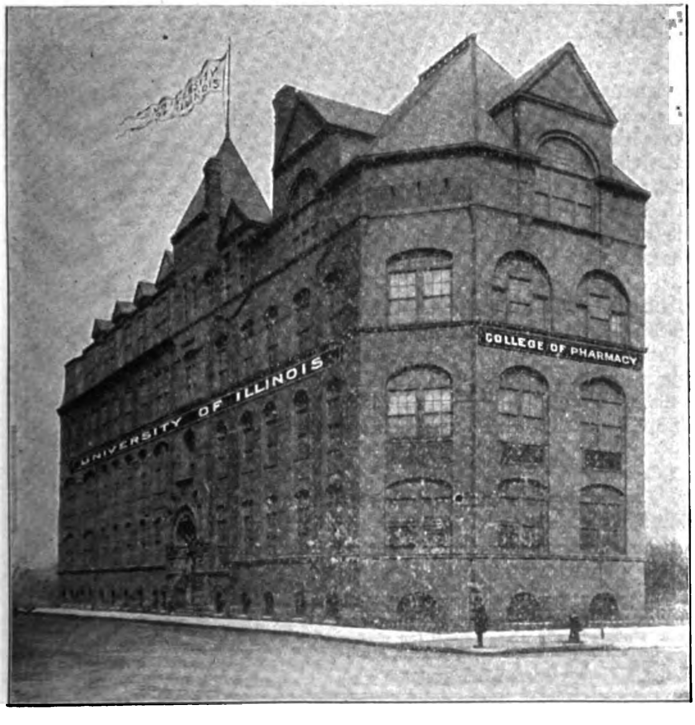
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,

40 Stone Street, NEW YORK



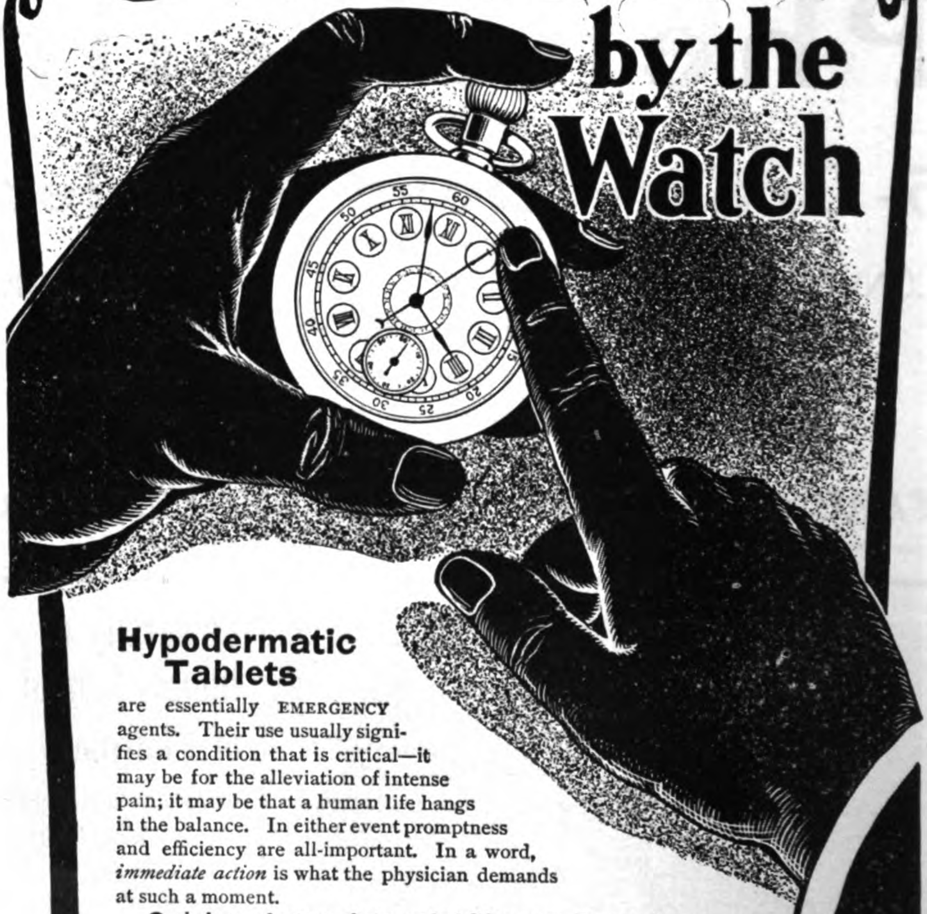
University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

5 Seconds by the Watch



Hypodermatic Tablets

are essentially EMERGENCY agents. Their use usually signifies a condition that is critical—it may be for the alleviation of intense pain; it may be that a human life hangs in the balance. In either event promptness and efficiency are all-important. In a word, *immediate action* is what the physician demands at such a moment.

Quick and complete solubility must characterize the tablet which meets this requirement. Flying to pieces when thrown into water is not sufficient. Many hypodermatic tablets do that, their undissolved particles settling to the bottom. *Mere disintegration!*

Ours *dissolve*—dissolve *completely*—in five seconds. Drop one of them into a syringe half filled with lukewarm water, shake vigorously, and note results. *Try it!*

Parke, Davis & Co.'s Hypodermatic Tablets can always be relied upon in an emergency. Prompt, efficient action follows their administration. There is never delay, never uncertainty. Always specify them when ordering.

PARKE, DAVIS & COMPANY

LABORATORIES: Detroit, Mich., U. S. A.; Walkerville, Ont.; Hounslow, Eng.
BRANCHES: New York, Chicago, St. Louis, Boston, Baltimore, New Orleans, Kansas City, Indianapolis,
Minneapolis, Memphis; London, Eng.; Montreal, Que.; Sydney, N. S. W.;
St. Petersburg, Russia; Simla, India; Tokio, Japan.

Pharmaceutical Review.

Volume 22. JUNE, 1904. Number 6.

The Nestor of Chicago Pharmacy.

Ezekil Herbert Sargent.

Born at Dover, N. H., November 18, 1880.
Died at Chicago, April 24, 1904.

By *Albert E. Ebert.*

Mr. Sargent lived with his parents until six years of age, when he went to live with his half-brother at Lowell, Mass. After eight years of schooling he was, at the age of fourteen years, apprenticed to the drug business with the firm of Carleton & Hovey, Lowell, Mass., with whom he remained for seven years. Among his clerk associates at this store were Chas. T. Carney of Boston, Mass., Henry W. Whitney of Andover Depot, Mass., Fred W. Willis and James W. Mill, later of Chicago.

Dr. F. Scammon, one of the pioneer druggist of Chicago, seeking a competent associate in his established drug business, was recommended by Messrs. Cutler Brothers of Boston, Mass., to secure Mr. Sargent for such position. Doctor Scammon invited Mr. Sargent to come to Chicago, which he did, arriving in the early part of 1852. A partnership was formed under the firm name of F. Scammon Co., consisting of Dr. Franklin Scammon, Myrick L. Scammon and E. H. Sargent, to succeed to the business of F. Scammon, 119 Lake Street, and which had just been removed to its new quarters at 140 Lake Street. Mr. Sargent assumed the general management of the drug business, which at that time was largely wholesale. Mr. Myrick Scammon giving his attention to a side line of business, consisting of daguerreotype material, and Dr. F. Scammon looking after the manufacture of linseed oil which was carried on extensively at that time by the firm of Scammon & Haven.

The firm of F. Scammon & Company did a prosperous business and was continued until 1856 when it was dissolved. Mr. Sargent associated himself with Mr. John C. Ilsley, a clerk of Sears & Smith, under the firm name of Sargent & Ilsley. They purchased the drug part of the business of F. Scammon & Company and continued it at the same old stand as a wholesale and retail business, The new firm started out with all the prospects of prosperity, times were good and business was good. But soon the financial horizon throughout the United States began to darken, and the panic in the fall of 1857 burst in all its fury over the north west, and many of the strongest business firms went to the wall. The young firm struggled on until the fall of 1859, when it wound up, and the business was sold out to Messrs. Wright and French, formerly of Boston, Mass., who removed the retail part of the business to the north west corner of Randolph and State Streets, and placed Mr. Sargent in charge of the same. Through his efforts it soon became one of the leading retail drug stores, not only of the city of Chicago, but of the north west.

In the summer of 1870 Mr. Sargent purchased the interests of his partners, and became the sole owner of a prosperous business of high reputation, which he had so successfully established; but he was not allowed to enjoy the fruits of his labors for any length of time, as the great fire of 1871 came upon him just when he felt that he was free from all financial entanglement, and the bright outlook was again darkened by the great calamity which left him penniless. However, with that indomitable energy that characterized the people of the stricken city, Mr. Sargent began at once to reestablish himself in the retail drug business at the north west corner of Wabash Avenue and 16th Street, and very soon did a good business.

Here he added physicians supplies, including surgical instruments and appliances, and remained in this location until 1878, when he removed to 125 State Street, adding chemists and assayers apparatus and supplies to his increasing business, which became so extentive that in 1892 he removed to larger quarters at 106 and 108 Wabash Ave.

In January 1903, he purchased the stock of chemical apparatus of Messrs. Richards Company, 108 Lake Street, which with his similar stock he removed to the present quarters, 143 and 145 Lake Street. The drug and physicians supply department was removed to 30 East Washington Street.

The above recital of Mr. Sargent's business career indicates the success of a most upright, honest and conscientious pharmacist of the past century. Let us scan his life and work from the professional side. He was in the foremost rank of advanced pharmacy and medicine. We do not overestimate by saying that he contributed more to the progress of these professions in Chicago and the north west than any other man of the period. He was one of the Charter Members of the Chicago College of Pharmacy, organized in 1859, and of which institution he was an officer and guiding spirit for nearly half a century.

He became a member of the American Pharmaceutical Association in 1864 and was its president in 1869. He was one of the founders of the Illinois State Microscopical Society, and of the State Pharmaceutical Association; a Director of the Chicago Botanical garden; a member and officer of the Chicago Academy of Sciences; a trustee of the School of Pharmacy of the Northwestern University; a member of the World's Congresses in 1893; the oldest living member at the time of his death of Oriental Lodge of Free Masons of Chicago; a member of the Church of the New Jerusalem. He was honored by the University of Illinois which bestowed upon him the honored title of Master in Pharmacy; he was equally honored with honorary membership by the Massachusetts College of Pharmacy, by the New Hampshire Pharmaceutical Association and many other societies.

He was married to Miss Mary Elmer, of Jeffersonville, Indiana, and had two children, a son and a daughter; the latter, Mrs. T. P. Smith Jr., with the widow surving him.

Mr. Sargent was present at the golden jubilee meeting of the American Pharmaceutical Association, held at Philadelphia, 1902, although he was not feeling well at the time. After the meeting he made a short visit to friends in Massachusetts and on returning home, took to bed and lingered along from a complication of diseases due to old age until the end came.

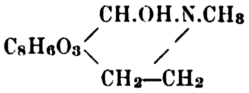
The funeral services took place April 27th, largely attended by old citizens of Chicago, the medical and pharmaceutical professions, and especially attended by the members of the Chicago Veteran Druggists Association, of which he was an honored past president. He was buried at Oakwood Cemetery. It was in everybody's mind, "That a good man has passed away, and the world is better for it, that he has lived". Among those who had tutelage and training under Mr. Sargent we recall previous to the fire, Samuel H. Larmanic, Peter J. Singer, Albert E. Ebert, Thomas W. Baird, Louis Strehl, John Corbidge, N. Gray Bartlett, Thomas N. Jamison, Judson S. Jacobus, Isaac H. Fry. Edwin R. Smith, Edward C. Jones, H. M. Palmer, George Ives, Fred'k M. Schmidt, and Rollin A. Keyes.

Progress in Alkaloidal Chemistry During the Year of 1903.

By *H. M. Gordin.*

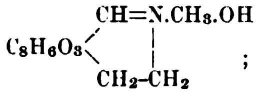
(Continued from page 182.)

On investigating the spectra from cotarnine, Dobbie, Lauder and Tinkler come to the conclusion that this alkaloid cannot be assumed to have the aldehyde form proposed by Roser, but that in the solid condition or in solution in ether or chloroform cotarnine has the carbinol form which alcohol or water change to the ammonium hydroxide form.



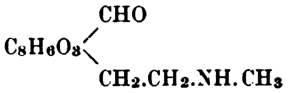
$$C_8H_6O_3{<}\begin{array}{l} CH.OH.N.CH_3 \\ CH_2-CH_2 \end{array} ;$$

Carbinol form.



$$C_8H_6O_3{<}\begin{array}{l} CH{=}N.CH_3.OH \\ CH_2-CH_2 \end{array} ;$$

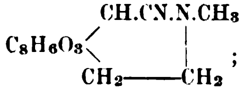
Ammonium hydroxide form.



$$C_8H_6O_3{<}\begin{array}{l} CHO \\ CH_2.CH_2.NH.CH_3 \end{array}$$

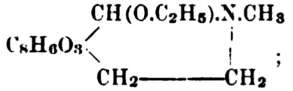
Aldehyde form.

When cotarnine is dissolved in ether or chloroform the spectra of the solutions which may be regarded as the true **spectra of cotarnine** agree with one another and also with those of hydrocotarnine and its salts; they are also identical with those of the cyanide and the ethoxy derivative of cotarnine, these substances having been regarded as derivatives of the carbinol form.



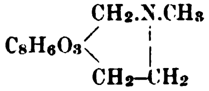
$$C_8H_6O_3{<}\begin{array}{l} CH.CN.N.CH_3 \\ CH_2-CH_2 \end{array} ;$$

Cotarnine cyanide.



$$C_8H_6O_3{<}\begin{array}{l} CH(O.C_2H_5).N.CH_3 \\ CH_2-CH_2 \end{array} ;$$

Ethoxy cotarnine.



$$C_8H_6O_3{<}\begin{array}{l} CH_2.N.CH_3 \\ CH_2-CH_2 \end{array}$$

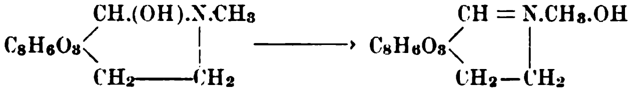
Hydrocotarnine.

The spectra of dilute aqueous or alcoholic solutions of cotarnine and those given by a solution of cotarnine hydrochloride from which the chlorine has been removed by means of silver oxide are almost identical with the spectra of cotarnine hydrochloride which on the other hand differ widely from the spectra of cotarnine in ether.

Cotarnine and its derivatives give one or the other of the following spectra: 1) The spectra of cotarnine in aqueous or alcoholic solutions and of cotarnine salts show a large amount of general absorption with two absorption bands, one of which is close to the visible region. 2) The spectra of cotarnine in ether or chloroform, hydrocotarnine, ethoxy-cotarnine and cotarnine cyanide show less general absorption and have a band much further removed from the visible region.

The substances in the first class are yellow, those in the second are colorless; the latter can be represented as having the carbinol constitution.

When cotarnine is dissolved in anhydrous alcohol it changes from the (colorless) carbinol to the (colored) ammonium hydroxide form:



The transformation is increased by heating or increasing the amount of alcohol. Methyl alcohol effects the transformation more rapidly than ethyl alcohol.

A colorless solution of cotarnine in alcohol cannot be obtained, but since the transformation into the quaternary base form proceeds slowly, it is possible to trace the transformation in all its phases by photographing the alcoholic solution immediately and again after successive intervals of time. The rate of progress may even be determined by comparing the photographs with those of the spectra of mixtures of the solutions of the hydrochloride (ammonium form) and the cyanide (carbinol form).

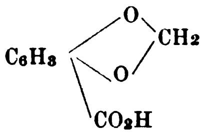
Potassium, sodium and barium hydroxide, and even ammonia promote the reverse change to that effected by alcohol. Sodium hydroxide changes at once the cotarnine in a solution of the hydrochloride to the carbinol form, but if an aqueous solution of cotarnine is treated with successively larger quantities of this alkali the reverse change is gradual and, as in the case of the opposite change induced by alcohol, can be traced through its various phases.

These results explain several of the peculiarities observed by Hatzsch and Kalb (Ber. Deut. chem. Ges. 32, 3109) in their experiments on the conductivity of cotarnine.

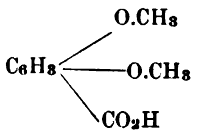
Preliminary experiments indicated that similar results are given by hydrastinine. (Proc. Chem. Soc. 19, 75.)

Dobbie and Lauder find that the spectra of those alkaloids of the group of berberine, corydaline, narcotine, hydrastine and papaverine, which are most closely related to each other, are very similar, the difference of the spectra becoming more pronounced as the structural differences increase in importance. Thus corydaline and tetrahydroberberine, closely resembling each other in structure, give similar spectra. Narcotine differs from hydrastine only by containing an additional methoxyl group, and their spectra are almost identical, but quite distinct from those of corydaline from which both differ considerably in structure.

It was found that the dioxymethylene complex exerts a more powerful absorption than two methoxyl groups. This was shown by comparing the spectra of piperonylic acid with those of veratric acid.

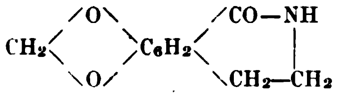


Piperonylic acid.

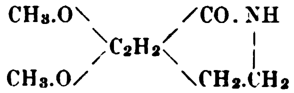


Veratric acid.

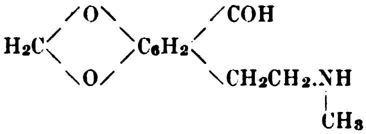
While the spectra of w-amino-ethyl-piperonyl-carboxylic anhydride from berberine and of corydaldine from corydaline are very similar, they differ widely from those of cotarnine and hydrastinine. The difference can be explained by the fact that in the first two the pyridine ring is closed whereas in the latter two it is open.



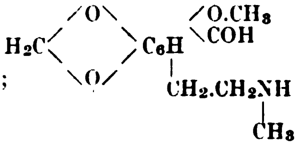
W-amino-ethyl-piperonyl-carboxylic anhydride.



Corydaldine.

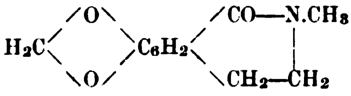


Hydrastinine.



Cotarnine.

When by means of potassium hydroxide hydrastinine is converted into oxyhydrastinine having a closed pyridine ring the oxyhydrastinine gives spectra almost identical with those of corydaldine.



Oxyhydrastinine.

The general results arrived at can be summed up as follows:

1) Alkaloids having different structures, even when they have the same formulae, give dissimilar spectra.

2) Alkaloids which are closely related structurally give similar spectra.

3) Homologous alkaloids give practically the same spectra.

As the formula of bulbocapnine differs from that of tetrahydroberberine or papaverine by only CH_2, the spectra of bulbocapnine and the latter two alkaloids being nevertheless very different, bulbocapnine cannot be a homolog of either of the other two.

4) When two alkaloids give spectra which are nearly but not quite identical it may be inferred that they differ only in minor details of structure. (Proc. Chem. Soc. 19, 7.)

Dobbie and Lauder have studied the absorption spectra of landanine $C_{20}H_{25}NO_4$ and landanosine $C_{21}H_{27}NO_4$ and found them to be identical and to resemble closely the spectra of corydaline and tetrahydropapaverine. The conclusion is drawn (see preceeding paragraph) that laudanine and laudanosine are homologous bodies and possess a structure similar to that of corydaline or tetrahydropapaverine.

Laudonosine seems to be more closely related to corydaline than to tetrahydropapaverine. Laudanosine has only one carbon atom less than corydaline. It may be assumed that the difference consists in the absence from laudanosine of a methyl group (which is present in corydaline) and the partial reduction of one of its rings.

$$\underset{\text{Corydaline.}}{C_{22}H_{27}NO_4} - CH^2 + H_2 = \underset{\text{Landanosine.}}{C_{21}H_{27}NO_4}$$

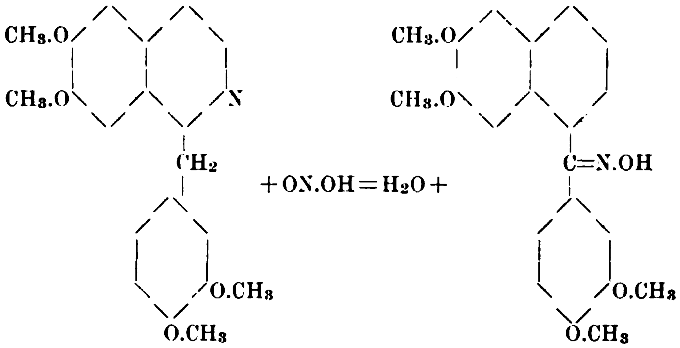
This would account for the close agreement between the spectra, as the absence of a methyl group and the addition of two H-atoms would not cause any noticeable modification of the spectra.

Many other points indicate the close relationship between laudanosine and corydaline. Like corydaline it contains four CH_3O-groups, gives methemipinic acid as one of the products of oxidation and is as easily oxidized to a yellow base. This yellow base is probably meconidine $C_{21}H_{23}NO_4$ present in opium. The formula of meconidine bears the same relationship to that of laudanosine which the formula of corydaline bears to tetrahydroberberine. The same relationship is also shown in the melting points.

Colorless:		
Corydaline.	Tetrahydroberberine.	Laudanosine.
$C_{22}H_{27}NO_4$	$C_{20}H_{21}NO_4$	$C_{21}H_{27}NO_4$
M. p. 135.5°	M. p. 167°	M. p. 89°
Yellow:		
Dehydrocorydaline.	Berberine.	Meconidine.
$C_{22}H_{23}NO_4$	$C_{20}H_{17}NO_4$	$C_{21}H_{23}NO_4$
M. p. 118—120°	M. p. 145°	M. p. 58°

(Proc. Chem. Soc. 19, 9.)

Amé Pictet and G. H. Kramers have studied the action of nitrous acid and hydrochloric acid upon **papaverine.** When sodium nitrite is added to a solution of papaverine hydrochloride papaveraldoxime is formed identical with the compound previously obtained by Goldschmiedt from papaveraldine by means of hydroxylamine. The reaction with nitrous acid is as follows:



Papaverine. Papaveraldoxime.

On decomposing the oxime with boiling hydrochloric acid papaveraldine is obtained.

If nitrous vapors (from action of nitrous acid upon arsenious acid) be passed into a boiling chloroformic solution of papaverine hydrochloride the nitrite of nitroso-papaverine is formed from which sodium carbonate liberates free nitrosopapaverine $C_{20}H_{20}NO_4(NO)$. It crystallizes in dazzling white silky needles melting at 181.5° and slowly turning green when exposed to light. It forms a hydrochloride melting at 181°, a nitrate melting at 183° with decomposition, a picrate crystallizing from hot alcohol in yellow transparent needles and melting at 120° and a yellow floculent chloroplatinate insoluble in boiling water. The latter when heated darkens at 226° and melts with decomposition at 235°.

That the new base contains a NO, not a N.OH-group follows from its insolubility in alkalies. As it does not give Liebermann's reaction the NO group must be attached to carbon, not to nitrogen. It can be considered as probable that the NO group is attached in the para-position to one of the CH_3O-groups of the dimethoxybenzyl nucleus of papaverine.

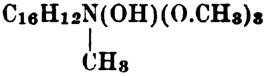
When papaverine, which according to Goldschmiedt contains four CH_3O-groups, is heated with an excess of strong hydrochloric acid two methyl groups are replaced by two H-atoms and dimethyl papaveroline $C_{16}H_9N(OCH_3)_2(OH)_2$ is formed. It forms a white mass quickly resinifying and turning green on exposure to air. It is soluble in acids and caustic alkalies, insoluble in alkaline carbonates, easily soluble in alcohol and difficultly soluble in ether. It gives a greenish-yellow color with ferric chloride and reduces ammoniacal silver nitrate solution. It forms an amorphous platinum salt and a picrate crystallizing from hot water in yellow needles and melting at 104°.

If dry papaverine hydrochloride is maintained for about twenty minutes at a temperature of 195—200° one molecule of methyl chloride is split off and trimethyl papaveroline is formed

$$C_{16}H_9(O.CH_3)_4N.HCl = CH_3Cl + C_{16}H_9(O.CH_3)_3(OH).N$$

It forms plates which are decomposed without melting at 240°. It is almost insoluble in ether and difficultly soluble in cold alcohol. It forms a hydrochloride containing water of crystallization and melting before drying at 65° and after drying at 192°. It also forms a picrate and a double salt with mercuric chloride. It is soluble in dilute but not in concetrated sodium hydrate. An iodo-methylate and from this, by shaking with silver chloride, a chloro-methylate were obtained.

It was thought that upon reducing the chloromethylate of trimethyl papaveroline with tin and hydrochloric acid laudanine would be formed, it having been shown previously that on replacing in laudanine one OH by a CH_3O-group n-methyl-tetrahydro-papaverine it formed which can also be obtained by reducing papaverine-iodo-methylate

$C_{16}H_9N.(OH)_4$	$C_{16}H_9N.(O.CH_3)_4$	 $C_{16}H_{12}\underset{\substack{\mid\\ CH_3}}{N}(OH)(O.CH_3)_3$
Papaveroline.	Papaverine or tetra-methylpapaveroline.	Laudanine.

Experiment has shown that instead of laudanine an isomeric substance was formed to which the name of iso-laudanine was given. It melts at 76° (laudanine melts at 166°) and gives color reactions with certain reagents that are different from those given by laudanine. The isomerism is due to a different position of the OH-group.

(Arch. sc. phys. nat. 4ième période, 15, 121.)

According to O. Hesse there exists in opium besides papaverine $C_{20}H_{21}NO_4$ an alkaloid similar to it and named pseudopapaverine $C_{21}H_{21}NO_4$.

The acid oxalate of papaverine crystallizes from water in crystals of two different forms according to concentration. Both forms melt at 195 with decomposition of the oxalic acid. A hydrochloride of papaverine was prepared melting at 210—213° with evolution of methyl chloride and formation of proto-papaverine (see below). Papaverine also gives a hydriodide melting at 196 and becoming yellow in the air and a sulphocyanate $C_{20}H_{21}NO_4.HCNS$ melting at 152° and difficultly soluble in boiling water. Papaverine liberated from its salts by ammonia and recrystallized from absolute alcohol dissolves in strong sulphuric acid to a perfectly colorless solution. Even on warming the solution there is no change in color till the acid begins to evolve white fumes when the solution assumes a rose color which suddenly changes to violet-purple. The violet-blue color which had been supposed to be given by solutions of papaverine in cold sulphuric acid must have been due to the presence of papaveramine.

Pseudo-papaverine was obtained by converting the acid oxalate into a sulphocyanate and recrystallizing the latter till it gave no color with sulphuric acid. It is more soluble in absolute alcohol at 15° than papaverine and difficultly soluble in chloroform. It forms a hydrochloride melting at 208—210° with evolution of vinylchloride, a pale orange colored platinum salt containing two molecules of water, an acid oxalate melting at 196° with effervescence, a sulphocyanate melting at about 150° a hydriodide having the composition $C_{21}H_{21}NO_4HI$ and melting with effervescence at 193° and another hydriodide containing three molecules of water.

By the action of heat upon papaverine hydrochloride two other alkaloids were obtained: apo-protopapaverine and protopapaverine (Compare preceding paragraph).

Apo-protopapaverine was obtained by heating papaverine hydrochloride for half an hour above its melting point after the evolution of gas has ceased. Its formula is $C_{19}H_{17}NO_8$ and is formed according to the equation

$$C_{20}H_{21}NO_4.HCl = CH_3Cl + H_2O + C_{19}H_{17}NO_8.$$

Both the amount of methyl chloride and water given off in the reaction were determined quantitatively.

It is soluble in alcohol and is left as an amorphous mass after evaporation of the solvent.

Protopapaverine $C_{19}H_{19}NO_4$ was obtained by keeping papaverine hydrochloride at its melting point till the dark brown mass almost ceased to effervesce. Protopapaverine is difficultly soluble in alcohol but dissolves very easily if phenyl hydrazine is added to the alcohol. It can also be purified by dissolving its hydrochloride in hot dilute alcohol and adding a slight excess of concentrated sodium carbonate solution. The alkaloid is formed according to following equation:

$$C_{20}H_{21}NO_4.HCl = CH_3Cl + C_{19}H_{19}NO_4.$$

It forms pale yellow leaflets which commence to become colored at 240° and melt to a black mass at about 260°. With strong sulphuric acid it forms a colorless solution which becomes violet-purple on warming.

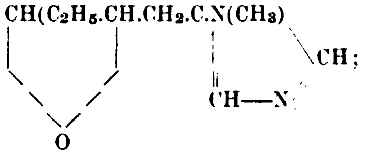
The alkaloid forms a hydrochloride containing five molecules of water of crystallization and melting when anhydrous at 200°. There were also prepared a hydriodide crystallizing with three molecules of water, a nitrate and an acid oxalate containing five molecules of water, melting at 138° and effervescing at 150°. On cooling a solution of protopapaverine in dilute potassium hydrate a potassium salt separates out.

An attempt to regenerate papaverine by methylating the potassium salt of protapapaverine was not succesful.

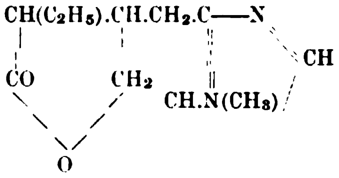
Still another alkaloid was obtained from ordinary papaverine by removing papaverine and pseudo-papaverine in the form of the very difficultly soluble sulphocyanates and shaking out the mother liquor, after making it alkaline with ammonia, with benzol. The alkaloid was named **papaveramine** and corresponded to $C_{21}H_{25}NO_6$. It crystallizes in colorless prisms melting at 128—129° is somewhat soluble in ammonia, insoluble in sodium hydrate, easily soluble in chloroform, difficultly soluble in acetic acid and does not neutralize acids. With concentrated sulphuric acid it immediately gives an intensively blue-violet solution and forms a chloroplatinate containing three molecules of water.

(Jr. pr. Chem. Neue Folge. 68, 190.)

H. A. D. Jowett shows that the correctness of the formula for **pilocarpine** proposed by Pinner and Schwartz (Ber. Dtsch. chem. Ges. 35, 2441) is not sufficiently proven. From a study of the reactions of dimethyl glyoxaline, dimethyl pyrazol and other substadces obtained in the distillation of the alkaloid with soda-lime it would seem that pilocarpine and isopilocarpine are stereo-isomeric and have one or the other of the two following formulae-

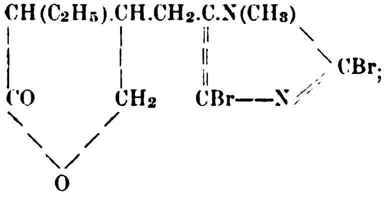


I

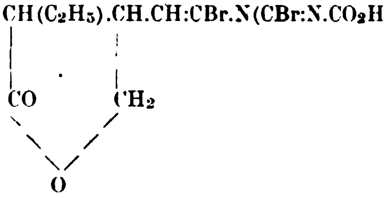


II

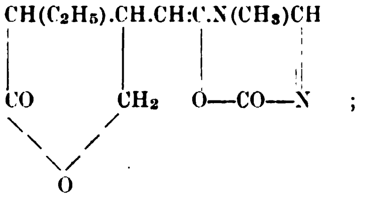
The formulae of some of the derivatives of the alkaloids would then be as follows:



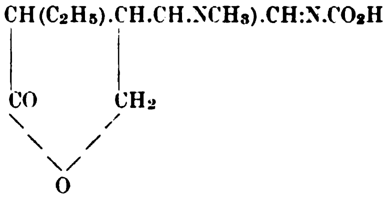
Dibrompilocarpine or dibromisopilocarpine.



Dibromisopilocarpine acid.



Isopilocarpinolactone.



Isopilocarpinic acid.

$CH(C_2H_5).CH.CO_2H.CH_2.CH:CH.N(CH_3).CBr:N.CO_2H$

Bromcarpinic acid.

Some other results arrived at in this investigation are as follows:

The oxidation product of pilocarpine with potassium permanganate at ordinary temperature consists almost entirely of homopilopic acid. As this acid is identical with the acids obtained by Pinner and Kohlhammer and named by them piluvic and homopilomalic acids the latter two names should be dropped.

Isopilocarpine could not be reduced either by sodium and boiling amyl alcohol or electrolytically. It does not form diacidic salts and upon titration with standard alkali behaves like a normal lactone.

The absorption spectra of pilocarpine and isopilocarpine were found by Dobbie to be identical.

Isopilocarpine metyl iodide when treated with picric acid forms isopilocarpine methyl picrate.

(J. Chem. Soc. London, 83, 438.)

The four isomeric compounds: cinchonine, allocinchonine, α-isocinchonine and β-isocinchonine all undoubtedly contain an OH-group and an unsaturated vinyl group ($CH:CH_2$); but the presence of these groups can only be shown in the first two compounds, not in α- or β-isocinchonine. As a reason for this difference in behaviour Skraup suggests the adjacent position of these groups which interferes with the general reactions of the groups.

Quantitative estimations show that the velocity of acetylization and the state of equilibrium of cinchonine and allocinchonine are nearly equal.

The best way to prepare α-iso-Ψ-cinchonicine (Skraup, Monatsh. Chem. 21, 535) is to heat α-iso-cinchonine disulphate in vacuum to 140°. It crystallizes from hot ammoniacal solution in microscopic needles containing water of crystallization and melting at 100—102°. Unlike cinchonicine the α-iso-Ψ-base does not react with phenylhydrazine. (Monatsh. Chem. 24, 311.)

Zd. H. Skraup and W. Egerer show that by warming cinchonicine with sulphuric acid it is transformed into β-iso-Ψ-cinchonicine. The change is similar to the one that takes place when cinchonine is treated with sulphuric acid. Like cinchonine cinchonicine forms an addition product with hydroiodic acid when its oxalate is heated four hours with the strong acid (Spec. grav. 1, 96).

(Monatsh. Chem. 24, 669.)

Skraup finds that upon adding potassium permanganate to β-*i*-Ψ-cinchonicine (made by heating β-*i*-cinchonine disulphate to 140°)

till the solution is permanently colored cinchoninic acid and *β-i*-meroquinene are obtained. The latter was found to be identical with the *β-i*-meroquinene obtained by oxidation of *β-i*-cinchonine showing that in the transformation of *β-i*-cinchonine into *β-i-Ψ*-cinchonicine the so-called second half of the cinchonic molecule from which the meroquinene part is formed remains even optically unchanged.

Several salts of *β-i*-meroquinene were prepared.

(Monatsh. Chem. 24, 291.)

W. Bickern isolated a glucoalkaloid which he named **casimirine** from *Casimiroa edulis*La Llave. The plant belongs to the family of the *Rutaccae* and is indigenous to Mexico and Central America. Casimirine has the formula $C_{30}H_{32}N_2O_5$, crystallizes from ether in needles melting at 106°, is easily soluble in water and alcohol, difficultly soluble in chloroform and ethyl acetate, has the odor of methyl nonyl ketone and reduces Fehling's solution particularly after boiling with 30% hydrochloric acid which breaks it up into glucose and another alkaloid. According to an examination by Cloetta casimirine has no hypnotic action. (The plant itself is said to act as a hypnotic.) (Arch. Pharm. 241, 166.)

(*To be continued.*)

The Proposed Volatile Oils of the U. S. P. 1900.

By *Edward Kremers.*

XXXV. OLEUM THYMI.

Oil of Thyme.[1])

A volatile oil[3]) *distilled from the leaves and flowering tops*[2]) *of* Thymus vulgaris *Linné* (*nat. ord.* Labiatæ).

It should be kept in well-stoppered bottles, in a cool place, protected from light.[4])

A yellowish or yellowish-red[5]) *liquid, having a strong odor*[6]) *of thyme, and an aromatic, pungent, afterwards cooling taste.*[7]) *It becomes darker and thicker by age and exposure to the air.*

Specific gravity: 0.900 to 0:930 at 15° C. (59° F.)[8])

It does not fulminate with iodine.[9])

The Oil is soluble in half its volume of alcohol,[10]) *forming a clear solution which is neutral or only very slightly acid to litmus paper. The*

Oil is also soluble, in all proportions, in carbon disulphide, and in glacial acetic acid.[11])

With a drop of ferric chloride T. S. the Oil yields a greenish-brown color, which changes to reddish.[12])

If 1 Cc. of the Oil be shaken with 10 Cc. of hot water, and, after cooling, the liquid be passed through a wet filter, the filtrate should not assume, with a drop of ferric chloride T. S., a bluish or violet color (*absence of* carbolic acid).[13])

1) According to Hirsch[1]) this oil is officinal in the following pharmacopœias: Belg., Dan., Gall., Germ., Helv., Hisp., Norv., Russ., Suec., U. S. In the U. S. P. it has been officinal since the 1860 edition.

2) Like the U. S. P., the Ph. G. prescribes the oil from the leaves and flowering tops, the Norv. calls for the oil from the flowering tops alone.

The commercial oil is obtained, as a rule, from the wild fresh flowering herb in France. There is also a Spanish oil.

3) Besides thymol (or carvacrol) oil of thyme containes cymene, traces oi l-pinene, also borneol and linalool. The phenol content of the oil varies, as a rule, between 20 and 25 p. c. and in rare instances rises as high as 42°. Whereas thymol is the phenol more commonly observed, it may displaced by carvacrol wholly or in part. Spanish oil of thyme has a larger phenol content, but contains no thymol.

4) The usual precautions.

5) According to the Ph. G., the oil is to be colorless.

"Both French and German oil of thyme are of a dirty, dark reddish-brown color." G.-H.-K., p. 624.

"Two commercial varieties are recognized the "red" and "white" oils. The former is the crude distillate, and probably owes its red colour to the action of the phenols present on the iron of the crude stills and condensers frequently used. The red oil when properly rectified forms the colourless or "white" oil of commerce." Parry, p. 212.

The red color can possibly be better explained, at least in large part, to the presence of quinhydrones in the oil. The assumption of such a pigment explains not only the disappearance of the color when the oil is heated, but also explains its reappearance in the oil recti fied in the ordinary manner. It also explains why it is easier to obtain a colorless oil to which much turpentine has been added. Comp. G.-H.-K., p. 624.

---

[1]) Universal Pharmakopöe, p. 658.

6) "Of a strongly aromatic odor." Ph. G.

"Of a pleasant, strong thyme odor." G.-H.-K., p. 624.

7) "Of a strongly aromatic ...... taste." Ph. G.

"Of a ...... biting, persistent taste." G.-H.-K., p. 624.

8) The sp. gr. requirements of the several pharmacopœias, as recorded by Hirsch, are as follows:

	0.870—0.890	Dan., Russ.
	0.870—0.905	Belg.
	0.880—0.900	Norv.
Not below	0.900	
	0.900—0.930	U. S.

"The genuine oil usually possesses a sp. gr. 0.905 to 0.935." Parry, p. 213.

"The density generally varies between 0.910 and 0.950." C.-D.-P., p. 562.

"The sp. gr. of a pure oil is always above 0.900, good French oil having a sp. gr. of 0.905—0.915. S. & Co. observed the sp. gr. 0.909—0.935 on their own distillates." G.-H.-K., p. 624.

9) The former test for turpentine oil, since abandoned.

10) "Soluble in 3 parts of a mixture of 100 vols. of alcohol and 14 vols. of water." Ph. G.

"It is soluble in ½ part of 90 p. c., and in 1—2 parts of 80 p. c. alcohol; of 70 p. c. alcohol 15—30 parts are mostly requisite to form a clear solution." G.-H.-K., p. 624.

11) These solvents appear to be rarely if ever employed.

12) Test of identity for thymol and carvacrol.

13) Test for carbolic acid, based on the greater solubility of this phenol compared with its higher homologues.

Optical Rotation.—"The genuine oil usually ..... is slightly laevo-rotary. Admixture of the oil of *Thymus serphyllum* increases the rotation, as this oil rotates up to —12°. Oils adulterated with French turpentine have a high laevo-rotation. A very large amount of the French 'white' oil contains a considerable quantity of turpentine." Parry, p. 213.

"The optical rotation is faintly laevogyrate, but in most instances cannot be observed on account of the dark color of the oil." G.-H.-K., p. 624.

Assay. — "The oil contains 20—30 p. c. of phenols, chiefly thymol and carvacrol, upon which the value ef the oil chiefly depends." Parry, p. 212.

"The phenol content of normal oil varies, as a rule, between 20—25 p. c. and in rare instances rises to 42 p. c.

In as much as these phenols are sometimes removed, or turpentine is added, an assay of the oil is of importance.

"A simple method, which is sufficiently accurate for most practical purposes, is applied in the following manner:

A burette of 60 cc. capacity calibrated into tenths is almost completely filled with 5 p. c. caustic soda solution. 10 cc. of the oil to be examined are then added, the burette stoppered with a well fitting cork, well shaken and set aside for 12—24 hours. Drops of oil adhering to the side of the burette are loosened by tapping and rotating the burette. After the alkaline solution has become clear the amount of non-phenol of oil is read off.

In order to determine at the same time whether the oil contains thymol or carvacrol, the alkaline solution of phenylate is separated from the oil, transferred to a separating funnel and acidulated with sulphuric acid. After the phenol has completely separated, the aqueous solution is run off and the oil set aside in a capsule in a cool place. If the oil consists of thymol it solidifies upon standing, or crystallization may be induced by adding a fragment of a thymol crystal. If it consists a carvacrol, the oil remains liquid. If both phenols are present it crystallizes partially.

"This method yields approximate results only. On the one hand the alkaline solution of phenols dissolves some of the hydrocarbons, on the other hand a part of the phenol remains dissolved in the oil. Both errors probably compensate each other. To remove the hydrocarbons dissolved in the alkali by shaking with ether, would simply increase the error inasmuch as thymol, and still more carvacrol, can be partly extracted from their alkaline solutions by ether.

"More rational, though more complicated, is the assay method devised by Kremers and Schreiner. It is a modification of the method suggested by Messinger and Vortmann, and is based upon the fact that in alkaline solution thymol combines with iodine to a red insoluble compound and that the excess of iodine can be titrated back by standard thiosulphate after the solution has been acidified. Each molecule of thymol requires four atoms of iodine for precipitation. The process is carried out in the following manner:

5 cc. of the oil to be examined are weighed and transferred to a burette provided with a glass stopper and calibrated into tenths. The oil is diluted with about an equal volume of petroleum ether. 5 p. c. soda solution is

added and the two solutions shaken. After the two solutions have separated upon standing, the aqueous solution is drawn off into a 100 cc. flask. This operation is repeated as long as the ethereal solution diminishes in volume. The alkaline phenol solution is diluted to 100 cc. or if necessary to 200 cc.

10 cc. of this solution are transferred to a measuring flask of 500 cc. capacity and N/10 iodine solution added in slight excess whereby the thymol is precipitated as a dark brown iodine compound. In order to ascertain whether sufficient iodine has been added, a few drops are transferred to a test tube and acidulated with hydrochloric acid. An excess of iodine is indicated by a brown color of the solution, an insufficient amount of iodine by milkiness produced by thymol. An excess of iodine having been established, the entire alkaline solution is acidulated and diluted to 500 cc. In 100 cc. of the filtrate the excess of iodine is ascertained by titration with N/10 hyposulphite solution.

The number of cc. of hyposulphite solution are deducted from the volume of iodine used and the resultant multiplied by five, this product indicating the total amount of iodine used by the thymol.

Each cc. of N/10 iodine corresponds to 0.003741 g. of thymol. From the amount of thymol found in the alkaline solution the percentage of phenol in the original oil can readily be ascertained.

The reaction involved is expressed by the following equation:

$$C_{10}H_{14}O + 4I + 2NaOH = C_{10}H_{12}I_2O + 2NaI + 2H_2O.$$

The carvacrol assay should be slightly modified, because the carvacrol iodide separates in a milky state. In order to obtain a precipitate the mixture is thouroughly shaken after the addition of iodine and then filtered. Then the solution is acidulated with hydrochloric acid and the process continued as directed under thymol. The calculation is the same." G.-H.-K., p. 627.

Pharmaceutical Legislation in New York During the Early Seventies.

Herewith are reproduced the report of the Executive Committee of the Apothecaries' Union and the address of Dr. Fr. Hoffmann delivered before the Union. Whereas the report gives a concise account of the legislation and the opposition to the law as enacted, Dr. Hoffmann's address points clearly to the need of wholesome pharmaceutical legislation. While opposed to the end to politics in such legislation, he sees in the bad law even an element of good because it is bound to lead to something better, whereas former indifference meant stagnation.

REPORT

OF THE

EXECUTIVE COMMITTEE

OF THE

APOTHECARIES' UNION,

OF

NEW YORK CITY AND SUBURBS,

IN RELATION TO THE

DRUG LAW AND THE LEGAL REGULATION OF PHARMACY,

INCLUDING

ADDRESS OF DR. FREDERICK HOFFMANN; COPY OF THE PRESENT
NEW YORK CITY DRUG LAW, AND DRAFT OF
PROPOSED NEW LAW.

Copies can be had gratuitously at the Store of:
MESSRS. M'KESSON & ROBBINS, 91 FULTON STREET.
" EIMER & AMEND, COR. 18TH ST. AND 3D AVE.

New York.
JOURNAL OF APPLIED CHEMISTRY PRINT.

1891.

REPORT
OF THE
EXECUTIVE COMMITTEE
OF THE
APOTHECARIES' UNION,
OF NEW YORK CITY AND SUBURBS.

THE Executive Committee of the Apothecaries' Union of New York and its suburbs, as in duty bound to the profession and the public at large, respectfully report:

The present Drug law for the City of New York, for the creation of a special commission to examine all persons engaged in dispensing medicines, was introduced into the Assembly of the State in January, 1871, and as first published, provided for a commission, to consist of six physicians, to examine all Drug Clerks, which included all persons engaged as clerks in importing or jobbing or retailing or dispensing drugs.

About February 1st the New York Drug Exchange, which represented the commercial interest, met and appointed a committee to oppose or modify this bill. After considerable effort in committee, and in the Legislature, the bill was modified and passed the house of Assembly, providing for a commission of six persons, to consist of two Physicians, two Pharmacists and two Druggists, to examine only all persons engaged in dispensing drugs, etc., as principals or clerks. In passing the Senate this proposed bill was further modified by reducing the number of the commissioners to four persons, to consist of two Physicians, one Pharmacist and one Druggist, a singular combination, because it gave to the medical profession the control of the practice of Pharmacy in the City of New York. It took special pains to ignore the whole profession of Pharmacy, as well as the College of Pharmacy of the city—a respectable institution, chartered for educational purposes, which had been in successful operation nearly forty years. This board of four persons, as finally created, was made to consist of but one Pharmacist with one Druggist, when, in fact, no Druggist was fitted to fill the position unless he understood Pharmacy, as well as Pharmacognosy.

The enactment of this law, which conferred unlimited privileges on a commission to be filled, and to hold office as the Mayor of the city should please; with power to name any sum however exorbitant for a license to practice Pharmacy, and to reject any applicant they chose if not personally agreeable to the commissioners or political party in power, aroused and alarmed the Pharmacists of New York, because it was a direct blow at the independence as well as the dignity of the profession.

When the commissioners met in July and resolved to impose a fee of thirty dollars for a license to all principals and ten dollars to all assistants, whether they were graduates in Pharmacy or otherwise, although they (the commissioners) were amply paid by an allowance of 12,500 dollars per year, for doing what the New York College of Pharmacy had always desired power to do for nothing, it became evident that the profession with *all its diplomas ignored,* had nothing to expect from the commissioners, either *as just men* or persons who would consider the interests of Pharmacy.

In this emergency the New York College of Pharmacy, which should have been the exponent of the rights of its own graduates as well as the interests of the profession, took no steps to meet the necessities of the situation; it gave no advice; it called no meetings, and as far as it could it supinely submitted, and the result was that a preliminary meeting of Druggists and Pharmacists was called by a provisional committee, on the 27th of July, to consider the situation.

This meeting in view of the shortcoming of the College of Pharmacy, resolved upon the organization of a "Druggists' Protective Union," elected officers *pro tempore,* and a committee to draft a constitution. At a second meeting, on the 4th of August, the proposed constitution was adopted, and the organization made a permanent one as the "Apothecaries' Union of New York City and Suburbs."

The aims of this association are embodied in article I of its constitution, as follows:

1. Its aim shall be to protect each individual member of the association from all unjust and illegal attacks upon either his integrity or property.
2. To secure equitable and judicious legislation for the practice of Pharmacy, for the sale of poisons, and for the obligatory qualification and education of Pharmacists.
3. To improve the science and art of Pharmacy by diffusing scientific knowledge among apothecaries and druggists, fostering pharmaceutical literature, developing talent, stimulating literature, discovery and invention, and encouraging home production and manufacture in the several parts of the drug business.
4. To establish amicable relations between all the druggists, chemists, apothecaries and pharmacists, thereby promoting the public welfare, and tending to our mutual strength and advantage.

ARTICLE II. Every educated pharmacist or druggist in good moral and professional standing, whether in business or retired from business, or employed in the business by another, shall be eligible to membership and be considered a member by signing the constitution.

At a third meeting of the Union, on the 10th of August, the undersigned executive committee was elected, and charged to take legal advice in regard to the validity of this law, and to take all requisite steps toward the securing of a better law. At the same meeting Dr. Frederick Hoffmann read, by invitation of the "Union," an address on the subject of the legal regulation of the practice of Pharmacy. The meeting indorsed the principles of this address, and ordered its publication by the following resolution: "That the thanks of the society be tendered to Doctor Hoffmann for his able and valuable address, and that the same be published in pamphlet form, and widely distributed as a protest against the present law."

In compliance with its duty the executive committee has to report that it has taken advice from different members of the bar, and thereby ascertained that the present *law is valid,* and that the same *cannot be* successfully opposed; consequently, the Pharmacists of New York will have to submit to this enactment, and the New York College of Pharmacy will have to see its diplomas ignored until the law can be repealed.

It gives us pleasure to state that the aims and efforts of the Apothecaries' Union, and the labors of its executive committee, have met appreciation and encouragement from the best pharmacists in the country, and in order to submit the entire matter to a full and just understanding the undersigned committee has published the address of Doctor Hoffmann, and recommends it for a wide distribution. This committee has also deemed it expedient to submit to consideration and comment a draft for a proposed new law, which is based upon the principles of the draft of the American Pharmaceutical Association, and similar to the existing laws in the States of Rhode Island and Maryland, and proposed in other States of the Union.

This proposed law acknowledges the diplomas of American and Foreign Pharmaceutical Schools and Boards of good repute, and does not impose in any way upon the rights of individuals engaged in the pursuits of the profession. It has been submitted for comment and suggestions in a general meeting of both the German Apothecaries' Associations in the City of New York, and has received the approval and the support of both associations. The next general meeting of the Apothecaries' Union will give all an opportunity to have a full interchange of opinion about the subject.

The executive committee is determined to continue its labors with or without others, being confident of ultimate success, and we respectfully advise pharmacists not to be indifferent, nor to undervalue the vital interests of our pursuit, nor supinely to await further enactments that uninformed or unscrupulous politicians may see fit to inaugurate as such omission might, among other burdens, impose a new examination, and an additional fee for another license.

The adoption of a judicious and equitable law, superseding present defective laws, is now a necessity which cannot be deferred, and we trust our fellow Pharmacists throughout the State will recognise it as a duty in the future to take better care of the interests of our profession, and to strive to elevate and advance the status of Pharmacy, and so unite as to secure at the next session of our State Legislature, wise and just enactments for the legal regulation of the practice of pharmacy and the qualification of pharmaceutists.

Respectfully submitted,
FREDERICK HOFFMANN,
DAN'L C. ROBBINS,
B. G. AMEND,
GUST. RAMSPERGER,
JAMES CONDIE,
P. BALLUFF.
New York, Sept. 16, 1871. For the Committee.

MR. PRESIDENT AND GENTLEMEN:

The importance of the subject which initiated the organization of this Association has happily contributed to an increased interest in the public mind with regard to the present unrestricted system of the practice of medicine and pharmacy in this country, and especially in the city of New York. A number of serious, and, in many instances, most criminal accidents, occurring in this and other large cities, have thoroughly awakened public attention to the dangers to which all are alleged to be liable who have occasion to resort to the druggist. Much injustice has been done to our profession in the discussion of these accidents in the public press, showing a remarkable lack of familiarity with the scope and detail of the practice of pharmacy; but, on the whole, this discussion has aided the cause which educated pharamcists have at heart—the securing enactments for the regulation of the practice of pharmacy, for the sale of poisons, for the prevention of the adulteration of drugs and medicines, and for the obligatory education of pharmacists. Heretofore druggists have refrained from participation in this discussion, and have not acted in concert in the matter of the drug law recently imposed upon them, without consulting their rights or interests.

This law was passed so unexpectedly that there was no sufficient time for discussion, alteration, or mature consideration. As the law now stands it is fragmentary, is no efficient safeguard to the public, and law-abiding and educated pharmacists, who are well acquainted with the legal restrictions of pharmacy in foreign countries, and not afraid, at any time, to appear before a legitimately appointed commission for examination as to their professional qualifications, cannot approve nor submit to this abortive law without respectful remonstrance.

In accordance with a request tendered me by a preliminary meeting, which resulted in the organization of a union of apothecaries, for co-operation to secure their common interests, I have accepted the invitation to furnish a brief exposition of the desires and aims of pharmacists in regard to this matter.

Leaving it to others to comment on the practical bearings of the recent law, to weigh its merits and demerits, I shall restrict myself to the subject and aims of sound legislation for the practice of pharmacy, and to a brief retrospect of the previous action in the matter on the part of pharmacists, in order to place the present movement, and those pharmacists of New York who participate in or give countenance to it, properly before the community, and to secure a correct understanding of this important subject.

I will, with your permission, take this opportunity to call on the press, which has favored this subject with due interest, to concede justice to a time-honored profession which, in the contest for the right, the true and the good, throughout its long history, has ever taken active part and labored faithfully for the advance of science in the service of suffering humanity, and more recently in this country, in conquering indifference and in raising its status in spite of adversities.

The educated pharmacists have long advocated suitable legislation for the control of their pursuit, but they cannot supinely submit to a law which so evidently fails to realize the desired end. The intentions of its originators may have been good, and it may, possibly, be a step forward, if its short-comings and omissions, as well as its arbitrary execution, do not counteract its merits. The very deficiencies of the law also furnish substantial pretexts to those who, for one reason or another, oppose any such law. To avoid trouble we might, perhaps, for the present, have quietly submitted to this examination edict, and to the unjust pecuniary sacrifice, hoping gradually to arrive at more just and judicious as well as stringent legislation. Since, however, the agitation for a restrictive law has assumed so much importance, not only in our city, but throughout the country, we deem it opportune and obligatory not to allow the present stimulus to pass by without doing on our part all we can to obtain the passage of a law which will at once remedy the grievances that are now charged against pharmacists, in the removal of which the public, as well as ourselves are equally interested.

Neither the public nor the press seem to be aware that no class of people feel more the unsettled state and the serious consequences of the unrestrained system of the practice of medicine and pharmacy, than the medical and pharmaceutical professions; and none are more impressed with the increasing necessity of adequate legal enactments for their regulation. Still, how little support has the public contributed to such an end.

Some days ago it was stated in the "New York Tribune" that foreign pharmacists, on coming to the United States, are astonished at the fact that any one who pleases can here dispense the most subtle and dangerous drugs. Although the truth of this statement cannot be denied, I must state that educated pharmacists who emigrate to the United States are well informed of this state of things, and of the inevitable consequences of the unrestricted practice of medicine and pharmacy; but the most astonishing fact, if they are astonished at all, is the remarkable indifference of the public, and even of the medical profession and the medical press, to a profession whose status and moral standard is so intimately connected with life and health, and which commands, in most European countries, especial regard. They might be surprised at the want of respect for most of the learned professions in this country, likely, for the reason that they are not properly restricted. They might justly be astonished at the incapability of the public to discriminate between the educated physician and pharmacist and the pretender, whose persuasive qualifications and lack of character beguile and, in our large cities, frequently secure to him the greater patronage and pecuniary success. They must also be surprised at how inconsistent people may be under different circumstances. In a civil action, involving merely some supposed right or a paltry sum of money, which, when lost, could be regained by industry, they would not think of engaging for counsel any one except he had been admitted to the bar and consequently had studied law. Yet how often will they intrust their health and life to pretenders who do not possess a shadow of the scientific knowledge necessary to understand the nature and treatment of disease, or the nature and treatment of drugs and the powerful agents obtained from them.

That there are, as yet, no efficient laws restricting the practice of medicine and pharmacy to competent persons only, seems to me not in a small degree due to this indifference and inconsistency of the community, to the vague interest for and value of human life and health, and to the want of respect and credit accorded to those professions. The fact is, that, to this very day, the absence of efficient legislation renders it possible for totally ignorant persons, who, perhaps, have never given an hour's time of their previous life to the study of medicine or pharmacy, to assume the responsible position of a physician, or to open a store for the sale of drugs and the compounding of medicines, to confer upon the suffering the gratification of paying them their money as an equivalent of ignorance, quackery, and malpractice; even the sale of the most potent poisons, and still less the adulteration and sophistication of drugs and medicines has not been legally surrounded by such effective safeguards as the public might expect from the State and legislative authorities in our Union, and which have long been realized in other civilized countries.

The consequences are obvious, and are exemplified in the long series of grievances, and those accidents and crying evils which now alarm the public and arouse its indignation. Indeed, when there is, in spite of this lack of restriction and regulation, still so high a standard of character, so much professional accomplishment and qualification predominant in the drug trade and among the pharmacists throughout the country, we are bound to give due credit and to acknowledge the sound principles and the status of American pharmacy, and equally of the American character, when fully aroused to the importance of the subject.

But whom have we to charge with this state of lawlessness, with this want of adequate legislation and jurisdiction? If we were called upon to vindicate the honor and the title of the pharmacist in this matter, we cannot but attribute the ultimate failure and the responsibility to the indifference of the public, and to the indifference and omission of our authorities and legislators. The educated pharmacists have long striven to attain this end with all the means within their reach. In their local and national organizations, they have repeatedly taken the initiative to secure reforms and suitable legislation, and they have always taken it in the right direction, aiming at a thorough education. It requires but a few remarks to exhibit the sentiments as well as the actions of the pharmacists at large on this important subject. Two years ago, when Chairman of the Committee on Progress of Pharmacy, in my Report to the American Pharmaceutical Association, then assembled at Chicago, I summed up the pending question in the following words, believing them the true sentiment of the educated pharmacists of the country:

"The urgent necessity of proper legislation regulating the practice of pharmacy and the sale of poisons, and for the prevention of adulterations and misuses of drugs and medicines, becomes more and more impressed upon the public. In no civilized country, perhaps, are the existing laws in this respect so totally inadequate, and a dead letter, and scarcely any community is exposed to criminal incompetence and imposture to such an extent, without adequate punishment, as ours. For the very reason of our republican institutions, the exercise of a profession with such momentous responsibilty ought to be restricted to competent and conscientious persons only. Another remedy for those crying evils, of which we hear so frequent and just complaint, it to give the pharmacist an education corresponding with general progress. These conditions can only be met through the enactment of suitable laws, and through the creation of some competent authority having control of the education of pharmacists, and responsible for the vigorous enforcement of the laws." (Proceedings Amer. Pharmac. Assoc. Vol. 17, page 271).

Moreover, this same National Association of Pharmacists appointed, in 1867, a committee to collect all the laws existing in the United States bearing upon the exercise of the drug trade, and to urge upon the legislatures the importance of judicious, but stringent and, as far as practicable, uniform legal enactments restricting the practice of pharmacy. The Association further authorized and instructed its committee to offer any services which the Association can render to the various conventions for reforming State constitutions, and to the State legislatures, as opportunity may arise, wherein such bodies may consider the co-operation of the American Pharmaceutical Association either desirable or useful.

This committee has fulfilled its mission with great care and promptness; in order to carry out these views and to have a thorough interchange of sentiment upon the whole subject, the Secretary of the

Association issued circulars to the active members of the Association in each State, and to the Governors of all the States and Territories, requesting in view of the importance of the subject, their co-operation in obtaining reliable information and copies of laws or portions of laws bearing on the practice of pharmacy in their respective States. In reply to these communications, the Secretary received answer and the desired information from the Governors or Secretaries of most States and Territories of the Union. The result was that the State of Georgia was the only one in which a law was passed in 1847, intending to confine the practice of pharmacy to competent persons only; in the States of New York and Pennsylvania, local laws exist with reference merely to the City of New York, (enacted in 1839,) and to Lycoming County in Pennsylvania, (enacted in 1866,)—both have been a dead letter. A few sporadic attempts have been made in other States, but from various causes they either failed or remained entirely obsolete.

Hereupon, the committee of the American Pharmaceutical Association went to work, and the result of its labors and deliberations was a draft of a law regulating the practice of pharmacy and the sale of poisons, and to prevent the adulteration of drugs and medicines. This draft by its comprehensiveness and precision, is an excellent one in every respect. Together with other publications bearing upon the subject, I lay a copy of the draft upon the table, submitting it to due consideration of this New York Association and of its Executive Committee.

Upon this draft the American Pharmaceutical Association has acted as far as it has deemed expedient, by indorsing the same and its broad principles, and by sending a number of copies printed in pamphlet form to the Governors and to the speakers of the legislatures of all the States of the Union, with the request to act upon it whenever they may see fit, to *respond to the earnest desire and call* of the American Pharmaceutical Association, and of the community at large, for legal enactments upon this subject.

Since then, laws for the control of the practice of pharmacy have been enacted only for the city of Baltimore and for the State of Rhode Island, both enacted in March, 1870; the latter law being in the main an adoption of the draft of the American Pharmaceutical Association. Both are said to work to entire satisfaction.

Now, can anybody fairly charge the pharmacists with the absence and lack of efforts to obtain efficient and judicious legislation for their pursuit? Their sentiment, their respectful and concerted suggestions, nay—their urgent call for the proper control of all the details and bearings of the sale and dispensing of drugs and of the qualifications of the druggists, stand plainly and in definite shape before the proper authorities. Why have they not and do they not act upon them, and eradicate and remedy at once those serious and increasing evils which are consequent and so perceptible under our present unrestrained system?

The pharmacists have done their share to invoke the interest, the co-operation, and the initiative action of the State authorities, and they have done it in the right direction, left entirely out of sight in the recently enacted drug law—I mean the educational point. Aside from other deficiencies, as, for instance, the omission of any measures for the prevention of adulteration and sophistication and of the sale of inferior drugs and medicines, this law fails to institute any measures to remedy the pretended incompetency in the future by obligatory education and consequent general qualification of the pharmacists. The druggists of our large cities have for many years, at their own expense, and in spite of adversities, established Colleges and Schools of Pharmacy, for the instruction of their apprentices and clerks, and for the advance as well as the representation of their profession, not so much for their own especial advantage as to benefit the people, and make up for the deficiency of legislation, and to counteract the demoralizing consequences of the absence of legal control. They also have successfully aimed to cultivate a juster estimate of themselves, of their obligations, to advance character in the individual, to elevate the standard of morals in trade and the status of American Pharmacy.

There are Colleges of Pharmacy in the Union which, like the American Pharmaceutical Association, are held in high regard with the best similar scientific associations in Europe. Still, here in their own country, they receive but little notice or attention. In the State of New York, neither the legislature nor the public have ever given encouragement to the College of Pharmacy in New York City; and the legislature which recently passed the present Drug Law, in framing the same as well as in its practical execution, ignored the College of Pharmacy, as it also has acted without consulting with or in any way regarding the legitimate authority intrusted with the sanitary affairs of the metropolis, the Board of Health.

Now, it might properly be asked: why do not the pharmacists hail with satisfaction the appearance of this law, so much called for by themselves, and accepted with evident satisfaction by the public and the press? I believe I have already furnished, in my previous remarks, some reasons why they cannot approve this law in the whole. Since I, however, have neither time nor am called upon to comment or critisize the law and its shortcomings, I confine myself to a few of its deficiencies.

Does the law, beyond the arbitrary examination of the qualifications of the druggist, provide any measure or standard for the quality of the drugs and medicines dispensed in the stores? Is the standard of knowledge alone a sufficient guarantee for integrity, and for the quality of merchandise anl medicinal articles? In our port we have appraisers of drugs, of unquestionable accomplishments, still, our market is not distinguished for the excellence and unequivocal quality of crude drugs.

Is there any provision for a periodical inspection, by competent persons, of drug stores, to guard the public against imposition by adulteration or inferior articles, such as is the universal practice in countries where the profession is under legal surveillance?

And, finally, the law leaves the educational questions altogether out of its scope, namely, to provide measures for obligatory education for qualification. Such a provision naturally cannot apply at once, but it secures the fundamental remedy in the better qualification in the future.

No one fully acquainted with the subject and impressed with the necessity of *efficient* and *judicious* legislation, can approve the present law, which, by fair comparison, is but a poor substitute for the better but obsolete law of 1839, and cannot fairly compare with the British Pharmacy act and still less with the legal regulation for the education of pharmacists and the practice of pharmacy in other countries.

In concluding, I admit the many difficulties and obstacles to strict legislation and measures in any professionl pursuit of this kind in the United States. Our institutions and principles are so liberal and facile as not to admit, in many cases, even commensurate restrictions, much less such stringent measures as work so admirably in the sanitary affairs of the most advanced European countries. Our legislatures and judges cannot be expected to be so familiar with the complicated details of our pursuit, with its bearings and its vast requirements, as to frame judicious and equitable laws for its practice and restriction, without consulting with, and the co-operation of pharmaceutical advisers.

Moreover, laws do not furnish at once accomplished physicians and pharmacists; neither do they educate men. Legal enactments as well as prohibitions and oppressive measures, can never be effectual unless they are based upon the foundation of thorough education. The same arguments which we see now-a-days advanced in favor of a higher and sounder education of all future citizens, and of the special education and training for the various trades and scientific pursuits, we claim them also for our profession. Give us pupils trained by a thorough elementary education, to superior, intellectual and moral attainments, and imbued with vigor of mind, love for learning, and uncompromising probity; give us laws with commensurate scope to this fundamental issue and to the important points, some of which I have enumerated, and upon them we may securely rest the hope for effectually subduing, in a time not far distant, all those evils under which the practice of pharmacy now labors in our city and country, and in the removal of which the physician and the public are directly interested with ourselves. All the best tendencies of our time point to that issue.

In your endeavors to procure laws which, in rigidness, far surpass the scope of the recently enacted law, make your aim a high one, taking into consideration the spirit of our institutions, the rapid strides of science, and, above all, the true welfare of the public, with the least possible infringement upon the personal liberty of the individual. Justice and the spirit of our institutions, as well as of our national constitution, also entitle us to participation, or, at least, to a considerate hearing in the enactment of laws bearing upon our pursuit and prosperity; they still less tend to deprive a large and hard-working profession from participation in the management of its vital affairs.

We solicit from the public and the press a just appreciation of our aims and actions, as we fully recognize their claims upon all who deliberately share the grave responsibility of dispensing medicines to the suffering. With uncompromising rebuke we shall defy incompetency and imposition in our profession, until such, as we hope, will be effectually excluded in time by proper legislation. Should there be individuals who resort to this association, in the hope of finding shelter and protection for their lack of qualification to the responsible place of apothecary, let them be warned to stay away; they will never find, as I trust, countenance nor leniency. If there are men among us not legitimately educated to their pursuit, but who have for years faithfully and irreproachably discharged their duties, let them stand without submitting them to the indignity of passing a student's examination, let them accept the situation to their profit, and under the stimulus of the increasing demand for superior qualification of the apothecary, make up their deficient scientific acquirements.

Whatever action you may deem expedient to take do not divide your aims and energies, nor your deliberations. If there should be no other legitimate way to arrive at a better law, under the stimulus of the present agitation, a united effort might be made to exhibit to the next legislature the short-comings and the inconsistency of the present law, and to call for a law more comprehensive and equitable; and based upon sound and proper measures. The draft of a "law to regulate the practice of pharmacy and the sale of poisons, and to prevent the adulteration of drugs and medicines," already issued by the American Pharmaceutical Association, might once more be presented to the legislature, although on the ground of it being less complicated, the Baltimore law, with same emendation, or a draft of a proposed law, which I beg leave to lay upon the table, and submit to your consideration (see pages 18-24) might find less obstacles for its adoption for the city of New York and its suburbs.

The enactment of such a law would be of real and permanent advantage to the public, and would tend to elevate the standard and the aims of our profession, and would place it in its true position, commanding the confidence and the respect of our fellow-citizens.

New Remedies, Organic and Inorganic.

Agathin. *Syn.*—Salicyl-*a*-methylphenyl-hydrazone, cosmine.

Form.—$C_6H_5(CH_3)N—N:C_6H_4OH$.

Prep.—By condensation of equal molecules of salicylic aldehyde and asymmetric methyl phenyl hydrazine.

Prop.—Colorless, odorless and tasteless crystalline laminae; m. p. 74°; insol. in water; sol. in alcohol and other organic solvents. It is to be protected from light.

Use.—Antifebric, antirheumatic and antineuralgic. Dose 0.12—0.5 g. two to three times daily.

Agnin. An impure wool-fat. See Lanolin.

Agnolin. Purified wool-fat. See Lanolin.

Agniadin. A glucoside, reported to be identical with plumierid, used as a remedy against intermittent fever in doses of 0.12 to 0.25.

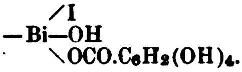
Agucarina. Syn. for saccharin.

Agurine. A hygroscopic mixture or compound of theobromine sodium and sodium acetate. It is used as diuretic in doses of 0.25 to 0.5 but should be avoided in certain diseases of the kidneys.

Aiodin. An odorless and tasteless preparation of the thyroid gland containing 0.4 p. c. of iodine, of which 1 part represents 10 parts of the gland. A powder or tablets of 0.1, 0.3 and 0.5 gram, used against myxedema.

$\left.\begin{matrix}\textbf{Airoform.}\\ \textbf{Airogen.}\end{matrix}\right\}$ Syns. for Airol.

Airol. *Syn.* — Airoform, Airogen, basic gallate of bismuth iodide, Bismutum gallicum oxyjodatum, Bismutum oxyjodogallicum, basisch gallussaures Jodwismuth, bismuth hydroxy iodide gallate.

Form.—

$$\mathrm{Bi}\begin{matrix}/\mathrm{I}\\ —\mathrm{OH}\\ \backslash \mathrm{OCO.C_6H_2(OH)_4}\end{matrix}.$$

Prep.—By heating freshly precipitated bismuth oxiodide with water and gallic acid until a greenish-gray product results.

Prop.—A greenish-gray, fine powder which is odorless and tasteless, insoluble in water, alcohol and ether, readily soluble in caustic soda solution and dilute mineral acids. Moisture converts it into an orange-yellow more basic compound, poorer in iodine.

Prop.—Antiseptic and exsiccant, a substitute for iodoform and dermatol or basic bismuth gallate.

$\left.\begin{matrix}\textbf{Ajacol.}\\ \textbf{Ajakol.}\end{matrix}\right\}$ Syns. for Guaethol.

Alapurin. A purified wool-fat. See Lanolin.

Albargin. *Syn.*—Gelatose silber.

Prep.—An organic silver preparation, containing 15 p. c. of silver obtained by mixing concentrated, neutral solutions of glutoses (products of hydrolysis of glutin) and silver salts, and by isolating it either by evaporation or precipitation with alcohol or acetone.

Prop.—A light yellow powder, not readily affected by light, soluble in cold and warm water without decomposition. Its solutions are to be kept in amber-colored bottles.

Use.—As antigonorrhoic in solutions of 0.1—0.15—0.2 p. c.

Alboferrin. An albumin preparation containing iron and phosphorus which is free from peptones and albumoses.

Prop.—A light yellow powder (or tablet), almost odorless and tasteless, readily soluble in water.

Use.—As nutrient in anaemia, chlorosis etc.

Alcarnose. A nutrient consisting of albumoses, meat extractives, maltose, dextrin and salts; an artificial predigested food. It is supplied in capsules of 12.0 each, 10—12 of which are administered daily in bouillon or cacao.

Aleptone tablets are ferro-manganese tablets, containing 0.5 iron and 0.008 manganese either as peptonate or saccharate which are used as a substitute for the corresponding solutions.

P-Aleptone tablets contain colloidal ferro-manganese- peptonate.

S-Aleptone tablets contain ferro-manganese saccharate.

Aleuronate. Pure vegetable albumen, used as nutrient for diabetic patients and for dressing wounds.

Aleuronate, "new," is a proteid prepared from wheat according to a new process.

Alginic Acid. A nitrogen-containing acid obtained from *Laminaria*, a number of derivatives of which have been introduced by Stanford. See Alginoids.

Alginoid Antimony. A white compound insoluble in water obtained by double decomposition between antimony chloride and sodium alginate, containing 4.5 p. c. of antimony. Its ammoniacal solution retains the compound upon evaporation.

Alginoid Arsenic. It is obtained, like the preceding, from arsenic chloride. Its aqueous solution is suggested as a substitute for Fowler's solution.

Alginoid Bismuth. A yellow powder obtained by double decomposition of bismuth nitrate and sodium alginate, containing 32 p. c. of metallic bismuth. Its ammoniacal solution remains clear upon evaporation and is miscible with water, the aqueous solution being known as *Liquor bismuth alginici.*

Literary.

Books Reviewed.

GRUNDLINIEN DER ORGANISCHEN CHEMIE. Von Wilhelm Ostwald. Zweite verbesserte Auflage (fünftes bis achtes Tausend). Ein Bd., pp. xx, 808; mit 126 Textfiguren. Verlag von Wilhelm Engelmann in Leipzig. 1904.

In our review of the first edition of this work* it was stated that no matter what the personal opinion of the reader might be relative to the dissociation theory or other theories, chemists the world over would grant Professor Ostwald a respectful hearing. That they have done so becomes evident from the fact that an edition of four thousand copies has been exhausted within a few years and that the work has been translated into Russian and English and is now being translated into French.

Aside from the fact that Professor Ostwald occupies the position of a leader in modern physical chemistry and has developed a school of followers, it was pointed out that the time seemed ripe for a work of this kind. Not only do the followers of Ostwald welcome the expressions of their master on the application of recent physico-chemical theories to general inorganic chemistry, but his opponents must have been equally anxious to learn how he would carry these theories to their logical sequence. Add to these the large army of chemists who have not been able to follow the rapid changes in physical chemistry during the last two decades but who were eager to learn how the new theories were to modify their general conceptions of the science, and it will be readily understood why the large first edition should have been exhausted in a few years.

To assume from this fact that the theories advocated by the author are gaining universal acceptance is a conclusion that is as unwarranted in fact as it was to construct a general theory of solutions from a host of facts which have been observed under a limited set of conditions when water is used as solvent.

In the review of the first edition the writer discussed the general situation that made the publication of Ostwald's "Grundlinien" a timely and welcome contribution to chemical literature. In the review of the second edition it seems proper, therefore, to discuss some of the general characteristics of the work.

---

* This journal, vol. 19, p. 278.

Somewhere, whether in one of his public speeches or in one of his lectures, the writer does not recall at the present moment, Kekulé referred to his studies in Paris and London after having studied under Liebig. This was a stirring period in organic chemistry. Liebig had "made school" at Giessen and his scientific opponents had their followers. Kekulé not only became familiar with Liebig's point of view, but he learned to view the same facts from other points of view and thereby broadened. He could not well belong to three different schools and avoiding dogmatism he finally belonged to no school. The absence of personal contest in the developement of organic chemistry has been interpreted by certain chemists as indicative of stagnation. Some, however, believe that revolution and combattiveness are not always the greatest factors in progress and onward evolution.

While it would be unfair to claim that Ostwald carries a spirit of combattiveness into his Grundlinien, he himself admits that his presentation is onesided. It is the method of "school" and reminds of Mephistopheles' advice to the student: "Am besten ist's auch hier, wenn ihr nur einen hört und auf des Meisters Worte schwört."

No one will expect an ordinary text book to present the various hypotheses under controversy and a polemic of pros and cons. The "Grundlinien," however, are not an ordinary text book as the great demand for the first edition has clearly shown. It is also quite generally understood by the veterans of chemistry that there are two sides to most questions. But to state calmly that in the interest of the beginner only one side of a controverted subject is being presented does not speak well for a scientific spirit which alone should pervade a treatise of this kind. If in addition it can be shown that such facts as are not in harmony with the theories for which the author makes propaganda are apparently avoided, one cannot but feel that the missionary or war spirit is by no means always the best for the advancement of scientific truth. We can admire the man with a mission, be he a theologian, scientist or social reformer, but we should also regret distortion of any kind, especially in science.

The "Grundlinien" are written for students as well as teachers, a dual problem which evidently explains, at least in part, why the author rewrote the first few chapters three and even five times. On this side of the Atlantic we have been living under the supposition that the "Abiturient" of a German gymnasium knew at least something about the elements of physics and chemistry. It is a surprise, therefore, to learn that the German university students of chemistry must be told in detail what e. g. a pipette is and how it is to be used. The review of the elements also reads as though this chapter were written for the laity rather than for the university student with his supposed thorough preparation.

In this connection, attention should be called to the historic accounts of the conception element at the close of this chapter. Here the following statement occurs: Während die Elemente des Altertums und des Mittelalters wessentlich die Träger gewisser Eigenschaften waren, sind die heutigen Elemente die letzten Bestandteile bei der chemischen Analyse." But how about the periodic law according to which the properties of the elements are functions of their atomic weights, one may well ask. Is Professor Ostwald not aware that this law or some modification of it has gained a much firmer footing among chemists than most of the controverted hypotheses which he defends? As becomes apparent from the main part of the book, the theory of periodicity of properties of the elements evidently does not exist for him, although he outlines it in the last few pages of the book. The sentence which follows the above quotation informs us that "Für die Durchführung dieser Auffassung hat der englische Chemiker und Ppysiker Robert Boyle (um 1660) Wesentliches gethan." The original of Boyle's "Sceptical Chemist" not being on hand, the writer quotes from Ernst von Meyer's "Geschichte der Chemie": "Er sprach als Grundsatz aus, dass die nachweisbaren nicht zerlegbaren Bestandtheile der Körper als Elemente zu betrachten seien; er hielt es für bedenklich, über die Elementareigenschaften im Allgemeinen Ansichten aufzustellen, ohne eine feste Grundlage in den thatsächlichen Eigenschaften der Grundstoffe selbst gewonnen zu haben." This certainly does not harmonize with the claim that the elements are no longer to regarded as bearers of certain properties, but merely as the ultimate products of chemical analysis.

A discussion of Ostwald's treatment of the periodic law and the lack of its application to the main body of the book will have to be left to a later discussion. He deplores the fact that in so many text books, chemistry is placed on a lower level than is physics in corresponding books used by the same students. Yet he makes no use of the opportunity, afforded by the law of periodicity, to present the host of inorganic compounds as representatives of relatively few types. The modification of the periodic law, that the properties of substances, including the elements in molecular form, are functions of their structure has evidently never occurred to him or at least not been fully appreciated. The argument of onesidedness, which he brings forward on the last page, certainly applies equally, if not more so, to some of his pet theories. It is a pity that a text book which pretends to present the "Grundlinien" of inorganic chemistry in the most advanced light of chemical science at the beginning of the twentieth century, should present the subject matter according to the elementary fashion of "Naturbeschreibung" rather than in a more philosophic manner. One cannot fail to be impressed with the fact that it was propaganda for his pet theories rather than the best scientific presentation possible that induced the author to adopt the particular didactic form which we find in the "Grundlinien".

The writer does not intend to go into details, but one other general feature should be mentioned before closing this review. The book is written in a very readable style. Not infrequently you feel as though you heard the author lecture. While this form of presentation makes statements almost unnecessarily verbose at times, it is by no means unpleasant. The reader is easily carried forward from one statement to another and does not fatique as is often the case with the reading of text books. Neither does the "naturbeschreibende" art of presentation make such demands on the mental capacity of the reader as a more philosophical account of necessity would.

With this easy-going manner of presentation of facts goes the method of presentation of theories. We doubt, however, whether as to their place of presentation the author can claim much originality. Other writers of text books have followed the same principle long ago, though they may not have done so in as facile or "artistic" a manner as the author of the "Grundlinien."

This review may seem unnecessarily lengthy for a book of less than one thousand pages; it certainly is unusually so. The book, reviewed only in part, is an unusual one and therefore, deserves more than the customary attention. If we have been more critical than ordinarily, it is because the book not only merits but demands it. Its author speaks as one with authority for a certain school of modern chemists. He admitedly presents only his point of view.

In the interests of our science this point of view should therefore be illumined from all sides, hence this rather lengthy discussion.

While the writer has reviewed the second edition of the "Grundlinien" in a more critical vein than the first, he desires to close this presentation of his critique with a few words of appreciation which were expressed at the time of the first appearance of this book:

"The advantage of the work lies in the fact that it shows what a one-sided interpretation of hosts of facts can accomplish in paving the way for a broader understanding. It marks an epoch, not of decay, but of growth. To those who have been staying behind in the rapid development of physical chemistry during the past two decades, this treatise will be well-nigh invaluable because of the very nature of its presentation." *E. K.*

HILFSBUCH FUER DAS APOTHEKENLABORATORIUM von Dr. Johannes Prescher and Viktor Rabs. Ein Bd., pp. V, 160, mit 73 Abbildungen und 1 Tabelle. A Stuber's Verlag, (C. Kabitzsch) Würzburg, 1904. Mk. 4.20.

The first chapter of Part I is devoted to a study of the common chemical and pharmaceutical operations, such as crystallization, filtration, precipitation etc., together with a description accompanied by illustrations of the more simple laboratory apparatus.

In the second chapter the subject of qualitative chemical analysis is taken up, and a general scheme for the analysis of both acids and bases is given in an accompanying chart. Then follows a chapter on electrochemistry and especially on the ionic theory.

The first chapter of Part II is devoted to a study of stoichimetrical problems, and the balance of Part II is devoted to chemical preparations, both, inorganic and organic.

In this book the authors have tried to compile the more practical pharmaceutical and chemical methods from larger books on chemistry, to serve as a laboratory guide for beginners in chemistry.

In addition it also contains a store of valuable information for those more advanced. Although the chapter on pharmaceutical and chemical operations gives no lengthy details, it yet contains the essential principles of the operations, and more specially of the apparatus used.

The chapter on qualitative analysis treats of only the more common elements and the method can well be applied to the ordinary mixtures met with, but is not sufficient for more complicated problems. The short chapter on electrochemistry seems to be rather out of place in this book, as it neither conveys a general idea of electrochemistry, nor does it contain a practical application of any one part of this subject.

The chapters on chemical preparations are the most praiseworthy part of the book, especially those devoted to organic chemistry. Most of the important reactions of organic chemistry, such as nitration, reduction, esterification, diazotation, etc., are taken up and one or more methods gived in detail under each process. A description of the apparatus used and structural reactions accompany each preparation.

The work ought to be very serviceable to those who do not have access to a number of larger laboratory manuals.

I. W. Brandel.

RECHERCHES MICROCHIMIQUES SUR QUELQUES GLUCOSIDES ET QUELQUES TANNINS VÉGÉTAUX, par Albert Goris. One vol., pp. 144, with 9 plates. A. Joanin & Cie., Éditeurs. Paris. 1903.

After a brief introduction, in which the author gives a concise account of the inception and progress of his work, the methods of localization of active vegetable principles are reviewed, giving bibliographic references.

In the second part the author discusses: 1) Aesculine, its properties and reactions that permit its localization; 2) The special localization of aesculine in the tissues of the organs of *Aesculus hippocastanus;* 3) Distribution of the aesculine-containing cells in the tissues of the different organs; 4) Aesculitannic acid, its distribution and its relation to aesculine; 5) Localization of aesculine in *Pavia rubra.*

The third part is devoted to a like study of other glucosides, viz. of fustine in *Rhus cotinus,* of fraxine in *Fraxinus excelsior,* of daphnine in *Daphne alpina,* of salicine in *Salix alba,* and of caffeine.

The fourth part, besides containing a bibliographic index, presents a resumé of views of the physiologic role played by alkaloides, glucosides and tannins in plants. That the experiments recorded in this contribution to knowledge would settle the controverted points of this perplexing problem was not to be expected. Like every other exact contribution to this subject, no matter how limited, it should be welcomed.

E. K.

ELEMENTARY CHEMISTRY by F. W. Clarke, Chief Chemist of the United States Geological Survey, and L. M. Dennis, Professor of Inorganic and Analytical Chemistry, Cornell University. American Book Company.

This work consists of a text of some 330 pages, descriptive of the more common elements and their compounds, with an accompanying Laboratory Manual of experiments, the alternate pages of which are blank for students' notes. One has a right to expect a considerable degree of excellence from a book bearing the name of two men of as high standing in their profession as are the authors of this work, and one reads with pleasure the following in the preface. "During the past thirty years the position of chemistry as an essential element in higher education has steadily improved...... Now every good high school, preparatory school, and college assigns ample time to chemistry, and laboratory teaching has become well-nigh universal. The latter, indeed, represents a modern development in education, something in which the older systems were lacking; and now the student is taught to observe accurately, to draw correct conclusions from what he sees, and to test experimentally the truth of statements which were formerly accepted without question."

The reviewer feels quite disappointed after reading an excellent preface, that men who are known to keep pace with the development of science year by year, as are the authors of this book, should be willing to place before the public as a new book one which is, for the most part, a literal reprint of a book published twenty years ago. "Clarke's Elementary Chemistry." The methods of teaching, as well as the rapid development of chemistry since 1884 would seem to demand such a recasting of the text of that day as to make the work a fairly good representative of the present state of the science. In some respects the text has been revised, as for instance the discovery of liquid air and its method of production is given, and the rare elements of the atmosphere are also mentioned. But it does not seem that the changes in the text are sufficient to satisfy a teacher of the present day. The book is well printed, the paper is good, the cuts are rather cheap but perhaps sufficient for the purpose. *W. W. Daniells.*

REVUE DES MÉDICAMENTS NOUVEAUX ET DE QUELQUES MÉDICATIONS NOUVELLES. Par C. Crinon. 11e édition (1904) chez M. Rueff, éditeur, 106, boulevard Saint-Germain, Paris. 4 francs.

In the eleventh edition, which has appeared recently, the author has introduced those of the new remedies of the past year which, it would seem, are going to be of more than ephemeral interest in modern materia medica. Among these may be mentioned: collargol, dyspeptine, formane, gasterine, glycogene, helmithol, purgene, quinoformine, tachiol, theocine and veronal.

The general plan of the work has remained the same as that of the earlier editions, the success of which has proven its usefulness. For each substance a concise account of its method of preparation, its physical and chemical properties, its physiological action and therapeutic use, also the forms in which it is commonly administered, and finally the dose is given.

The welcome with which the first ten editions of this annual has been received by physicians and pharmacists augurs well for its continued usefulness. *E. K.*

THE ERA DRUGGISTS' DIRECTORY of the United States, Canada, Cuba, Porto Rico, Hawaiian Islands and Mexico, to which is added a list of the principal druggists in Chile, Peru, Bolivia, Ecuador and Columbia. Tenth Edition. October 1903. D. O. Haynes & Co. New York.

The "Era Directory" has stood the test of good service for ten years so that it seems unnecessary to call attention to its usefulness. The business man, upon opening the volume would, in all probability, make a careful study of the names of stores and firms in his own community and judge the accuracy and value of the book from the up-to-date correctness which he finds in that portion of the "Directory" devoted to his community.

The writer may be pardoned for not looking at this annual from the point of the business man, but to regard it for a moment, as the document of some future historian. The statistical value of the "Directory" will certainly become even greater as volume is added to volume year by year. The pharmaceutical statistician will not be able to get along without it even though he may find it necessary to supplement and corroborate it with the aid of other sources.

Though the statistical importance is naturally the first to suggest itself, the student of pharmaceutical economics and even of general sociology may find data which will cause him to reflect and to look back of the figures. Thus e. g. why is it that Burlington, Vt., with 18,640 inhabitants and 16 drug stores has soda fountains in all stores but two, whereas Madison, Wis., with 19,164 inhabitants and 15 drug stores has soda fountains in but eight stores. Why is it that, in the same state, Janesville with 10 drug stores and 13,185 inhabitants, has a soda fountain in every store, and Manitowoc with 7 drug stores and 11,786 inhabitants, has not a single fountain in a drug store?

The Historical Committee of the A. Ph. A. would like to secure a complete set of the "Era Directory" for the use of future historical students of American pharmacy. Single numbers will be acceptable, for these will ultimately make a set. *E. K.*

Mallinckrodt's CHEMICALS.

Pharmacists who handle the well known "M. C. W." brand are in a position to satisfy the most critical demands of physicians. The "M. C. W." brand costs no more than any other, and may be had from every wholesale drug house in the United States.

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 473 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street **111 Fifth Avenue**
PHILADELPHIA **NEW YORK**

LIVERPOOL, England.

To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. PRICE, 77 Lord Street, Liverpool, England.

BLOCKI'S

IDEAL Perfumes IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON,
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY

OF THE

UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the anthor makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High **Grade** Guaranteed Bicycles.

New 1903 Models

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High **Grade**	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

Any other make or model you want at ***one-third*** *usual price.* Choice of any standard tires **and best** equipment on all our bicycles. *Strongest* ***guarantee.***

We ***SHIP ON APPROVAL*** C. O. D. to **any one** *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels taken in trade by our Chicago retail stores, all makes and models, good as new............ **$3 to $8**

ESTAB-LISHED 12 YEARS

DO NOT BUY a bicycle until you have writen **for our FACTORY PRICES AND FREE TRIAL OFFER.**

Tires, equipment, sundries and sporting goods of all kinds, at half **regular price.** in our **big free sundry catalog.** Contains a world of useful information. **Write for it.**

J. L. MEAD CYCLE CO., Chicago, Ill.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

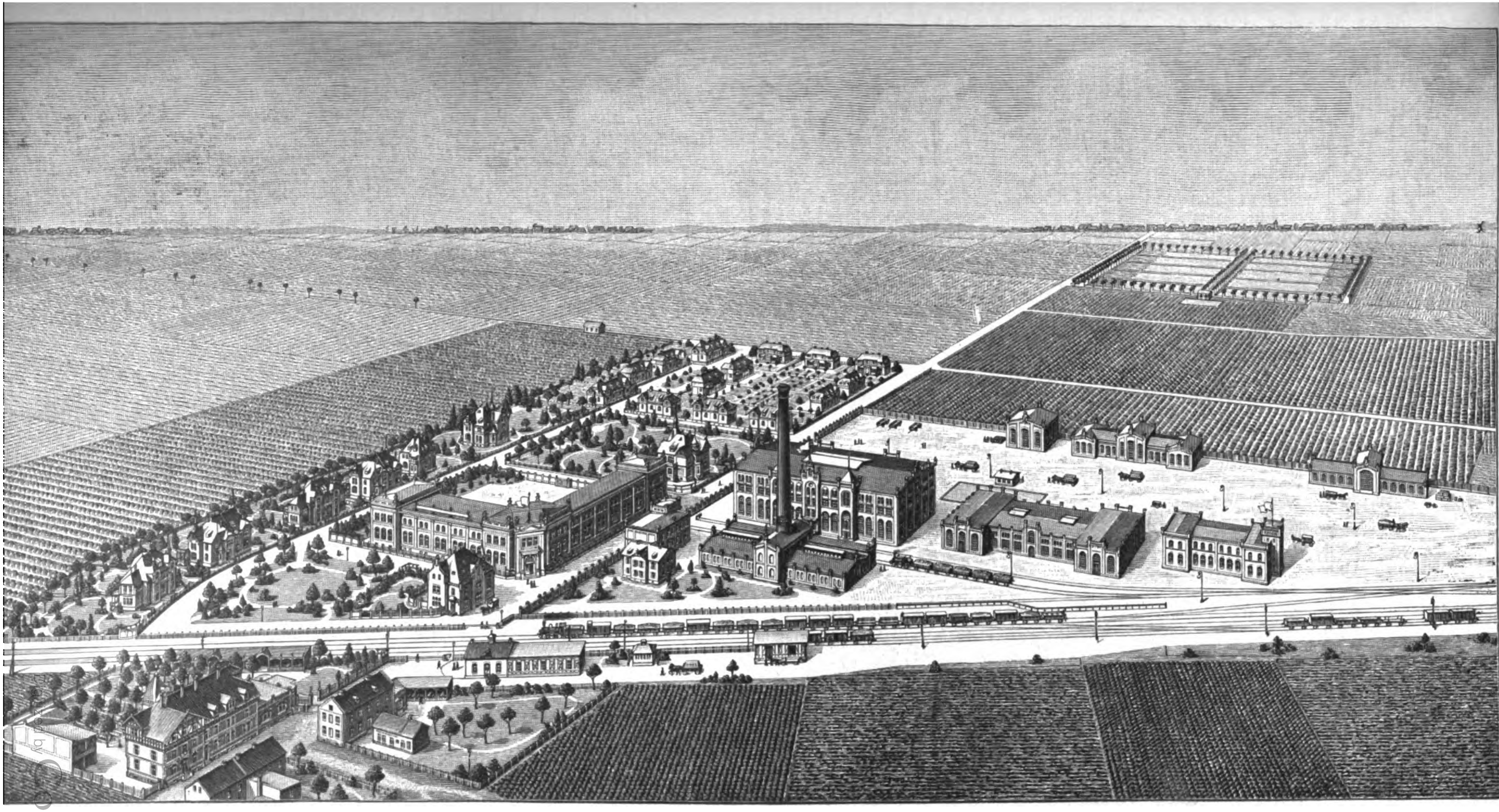
Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.



LABORATORIES AND FIELDS OF SCHIMMEL & CO. AT MILTITZ NEAR LEIPZIG.

ANNOUNCEMENTS BY ADVERTISERS.

PASTEUR.

THE Pasteur Institute at Paris, France, is a worthy monument to the genius of one of the world's benefactors.

Pasteur's fame is "a monument more last-ing than brass."

His name is indissolubly associated with the history of Bacteriology.

His life was replete with earned triumphs, good works, great achievements.

Within twenty years he and his staff of biologists conquered five great foes of the human race—diphtheria, hydrophobia, lockjaw, snake poison and that scourge of former centuries, the bubonic plague.

And the end is not yet.

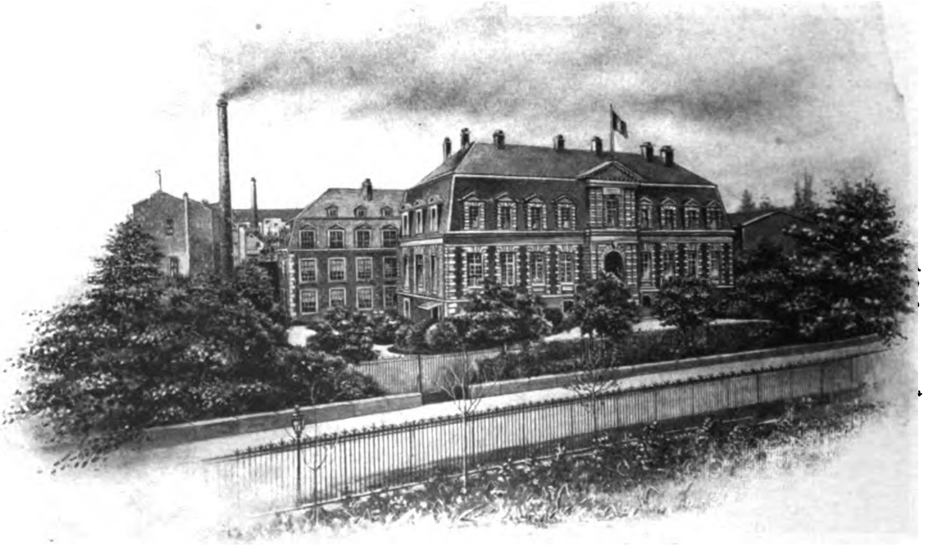
Pasteur died September 28, 1895, but his great work goes on.

Pasteur's "mantle descended upon worthy shoulders."

Roux, Duclaux, Metchnikoff and Yersin continued the work.

Roux and Yersin in 1888 discovered the toxin of diphtheria. This led to the discovery of the antitoxin by Behring. Thus began a new therapeutic era, and ever since, the world, both scientific and lay, has had a vital interest in serum therapy.

The staff of the Pasteur Institute at Paris, France, has embraced specialists whose achievements are a matter of history. Among these are Roux, Metchnikoff, whose studies of the blood have been of inestimable value, Marmorek, the discoverer of the streptococcic antitoxin, Yersin, the chief investigator of bubonic plague and cholera, Duclaux, Chamberland and many others who have devoted their lives to this great cause.



BACTERIOLOGIC INSTITUTE.

ROUX.

The Pasteur laboratories lead the world in the study of Serum Therapy.

The world is indebted to the creative genius of some member of the Pasteur Faculty for the original researches, as well as for every good point in the methods of manufacture of the various serums. The Pasteur Institute is both a great educator and a great benefactor to the world at large.

Pasteur Serums are uniform in strength and are made of one strength only. They do not contain any antiseptic agent.

Therefore large doses can be given with perfect safety.

Not only are they made under the personal supervision of the greatest living experts, but before they leave the laboratories they are certified to and carefully tested by the same eminent authorities.

This insures quality and informity.

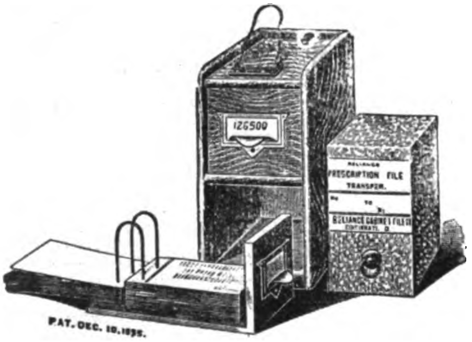
This also logically explains why physicians in all parts of the world have confidence in the absolute integrity of the Pasteur products.

With unequalled facilities for making and testing serums, with an unparalleled staff of eminent biologists and bacteriologists, and with a reputation that is world-wide, the Pasteur Institute's output is one of the largest in the world.

Their products are shipped to every quarter of the world.

SHARP & DOHME,
Sole Depositaries,
U. S. A.

HOSPITAL.


126500
RELIANCE PRESCRIPTION FILE TRANSFER.
RELIANCE CABINET FILE CO. CINCINNATI, O.
PAT. DEC. 10, 1895.

PRESCRIPTION FILE.

THE RELIANCE.

STYLE No. 1.

Cabinet has perforator on top. Each drawer has our patented arch file. Capacity of each drawer is 500 prescriptions. File is quick and handy and saves time and labor in referring to old numbers. Transfer cases have removable arch wires. Capacity is 1,000 prescriptions. Send for testimonials and our catalogue of our line of druggists' filing devices and specialties.

THE RELIANCE CABINET FILE CO.,
Station B. Cincinnati, Ohio.

SAFES

FIRE PROOF AND BURGLAR PROOF

Vault Doors

SAFE DEPOSIT BOXES

LOCKS

NACHER SAFE & LOCK CO.,
Sta. B. Cincinnati, O.

IODOCROL — THE IDEAL IODOFORM SUBSTITUTE.
(U. S. Pat. No. 561,531.)

A NEUTRAL peptonized solution of
Iron - - - - —0.42%—
and Manganese - - —0.07%—
Combined with Aromatics, making it acceptable to the weakest stomach. Pleasant in taste and readily assimilated.

★ ★ ★

Does not injure the teeth.

Liquor Ferro-Mangan Aromaticus—Urban—

Aromatic Elixir Peptonate of Iron and Manganese—Urban—

DOSE FOR ADULTS:

One to four teaspoonfuls in milk or sweet wine three times a day; before meals.

★ ★ ★

KREMERS — URBAN CO.,
PHARMACEUTICAL CHEMISTS,
MILWAUKEE, - - WISCONSIN.

KREMERS & URBAN CO., MANUFACTURING PHARMACISTS, **MILWAUKEE, WIS.**

An amusing novel which had a widespread sale all over the country since its publication last fall.

THE LIGHTNING CONDUCTOR

The Strange Adventures of a Motor Car

EDITED BY

C. N. and A. M. WILLIAMSON.

The Nation says of this automobile love story: "We are only too well satisfied to go on with such delightful ple, and especially through such delightful scenes. . . . This is old ground, but the unusual method of locomotion a fresh touch give it a new and living interest. . . . A light, graceful, accurate mention devoted to some places very satisfactory fulness to others. . . . The line of travel is among the châteaux of the Loire, to Bordeaux, a ner of Spain, Toulouse, Carcassonne, Marseilles, the French Riviera, the Italian Riviera, Pisa, Rome, Naples, Capri, finally Taorminia. It should be a good practical guide, too, to those about to go over the same course, while charming descriptions of travel afford an ample new fund of pleasure, tinged with envy here and there, to the y-at-homes."

PRICE $1.50.

Timely Books.

EMENT.	Handbook of modern Japan	Net	$1.40
IFFIN.	The mikado's empire. 2 vols		4.00
LICK.	Evolution of the Japanese	Net	2.00
VERIDGE	Russian advance	Net	2.50
RRARE.	Greater Russia	Net	3.00
RINE.	Expansion of Russia, 1815—1900	Net	1.50
MILTON.	Korea. Illustrations and maps	Net	4.00
——	The same. New, cheap Edition	Net	1.50
RTSHORNE.	Japan and her people. 2 vols	Net	4.00
EAD.	Japan of to-day	Net	2.00
RMAN.	All the Russias	Net	4.00
SHOP.	Korea and her neighbors		2.00

New and Forthcoming Books.

little traitor to the South, by Cyrus Townsend Brady. (Macmillan)		$1.50
e man Roosevelt, a portrait sketch, by Francis E. Leupp. (Appleton)	Net	1.25
illiam Penn, by Aug. B. Buell. (Appleton)	Net	2.25
mes Oglethorpe, by Harriet C. Cooper. (Appleton)	Net	1.00
he grave, a poem by Robert Blair, illustr. by 12 etchings. (Appleton)		1.50
he deliverance, by Ellen Glasgow. (Page & Co.)		1.50
ux Crucis, a tale of the great appostle. by Sam. M. Gardenshire. (Harper Bros.)		1.50
he American prisoner, by Eden Phillpotts. (Macmillan)		1.50
he sign of triumph, by Sheppard Stevens. (Page & Co.)		1.50
he story of king Sylvain and queen Aimee, by Morg. Sherwood. (Macmillan)		1.50
he colonel's opera cloak, by Christine C. Brush. (Little, Brown & Co.)		1.50
apoleon the First, a biography by Aug. Fournier. (Holt & Co.)	Net	2.00
apanese physical training, by H. Irving Hancock. Illus. (Putnams)	Net	1.25
ridge tactics, a complete self-instruction, by R. F. Foster. (Warne & Co.)		1.25
history of modern England, by Herbert W. Paul. Vol. I and II (complete in 5 vols.) (Macmillan)	Net.	5.00
he crossing, by Winston Churchill. (Macmillan)		1.50
aughters of Nijo, by Onoto Watanna. (Macmillan)		1.50
he faith of men, a volume of short stories, by Jack London. (Macmillan)		1.50
he people of the Abyss, by Jack London. New cheap Ed. (Macmillan)	Net	1.50
ife and teachings of Abbas Effendi, by Myron H. Phelps. (Putnam's Sons)	Net	1.40
here American independence began. Quincy, its famous group of patriots, their deeds, nomes and descendants, by Dan. Munro Wilson. Hought M. & Co.)	Net	2.25
Eighteenth Century essays on Shakespeare ed., by Nichol. Smith. (Macmillan Co.)	Net	3.00
A book of American humorous verse and a book of Am. prose-humor. 2 vols. (Stone & Co.) each		1.25
Electric traction, a practical hand-book on the application of electricity as a locomotive power, by John Hall Rider. Illus. (Macmillan)	Net	3.00
Man's place in the Universe, a study of the results of scientific research in relation to the unity or plurality of worlds, by Alfred R. Wallace. (McClure, Phillips & Co.)	Net	3.00
Peace and the vices, by Anna A. Rogers. (Scribner)		1.50
The history of American Music with some account of Music in America, by L. C. Elson,. (Macmillan)		
Whistler as I knew him, by Mortimer Wempes, with 100 full page plates in color. (Macmillan)	Net	6 00
Her infinite variety is the spice of life, by Brand Whittock. (Bobbs Merrill Co.)		1.50
When wilderness was king, by Randall Parrish. (McClurg)		.50
Robert Cavelter, a stirring romance of La Salle and the discovery of the Mississippi, by Wm. Dona Orutt. (McClurg)		50
The fugitive, Ezra S. Brudno. (Doubleday, Page & Co.)		1,50
Bred in the bone, by Thomas Nelson Page. (Scribners)		1.50
The Hermit and the wild woman, by Edith Wharton. (Scribners)		1.50
A volume of new stories, by Hy. Seton Merriman. (Scribners)		1.50
The past time of eternity, by Beatrix Demaress Lloyd. (Scribners)		1.50
My Friend Prospero. Henry Harland. (McClure, Phillips)		1.50
Mrs. McLerie. J. J. Bell. (Century Co.)		1.00
The close of the day. Frank M. Spearman. (Appleton)		1.25
A little garrison. Lieut. Bilse. (Stokes)		1.50
Violett. Baroness von Hutten. (Houghton, Mufflin & Co.)		1.50
The adventures of Elizabeth in Rugen. MacMillan		1.50
Breaking into seciety, by George Ade. Harpers		1.00
A country interlude, by Hildegarde Hawthorne. Houghton, M.		1.25
The day of the dog, by Geo. Barr McCutcheon. Dodd		1.25
The Gordon elopement, by Carolyn Wells & Harry P. Tabor. Doubleday		1.25
The great adventurer, by Robt. Shackleton. Doubleday		1.50
Joan of the valley, by Orin F. Bartlett. Houghton		1.50
The horse-leech's daughters, by Margaret D. Jackson. Houghton		1.50
Henderson, by Rose E. Young. Houghton		1.25
Advanced Bridge: the higher principles of the game analyzed and explained, by J. B. Elwell. Scribners	Net	1.25

Just Published:

SIR MORTIMER by Mary Johnston.

Author of "To Have and To Hold".

A romance of Elizabethan days, of uncommon power and imaginative beauty. The love of the gallant Sir ortimer for the fair Damaris Sedley, a lady of the court, runs like a poem through a narrative alive with stirring cidents of the days of Sir Walter Raleigh, when all England loved, sang, adventured and fought in the flush of outhful power. With frontispiece reproducing the colors of the original painting and eight other illustrations by C. Yohn, printed upon specially made India-tinted paper and mounted like photographs upon blank pages.

PRICE $1.50.

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer.
MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

Uruguay Beef Extrac

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or Besides possessing all the stimulating and nutritive a high grade Beef Extract, it is sold at a price which dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.

Sole Importers.

FORMIN. Hexamethylene - tetramine Merck. Presents th urinary antiseptic in its highest obtainable purity. In powder *preferably* in Merck's 5 and 7½-grm. tablets.

CREOLIN-PEARSON is a safe, efficient and positive Used the world over. Beware of imitations, which are poison the same time possess less disinfectant power. See that the of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it the real virtues of cod-liver oil reside in an active principle or Gaduol is the alcoholic extract of the active principles of It produces a stimulant and alterative effect on the processes and absorption, and does not disturb the appetite or affect A wine of cod-liver oil prepared from Gaduol is a favorite a large sale wherever introduced. Let us send you valuable

MILK SUGAR is an indispensable ingredient in the babies. It should be free from all impurity and adulter SUGAR MERCK is of the highest purity and fineness. Spec

Merck & Co., New Yo

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 7. JULY, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Drugs of Primitive Peoples 241

$\Delta^{1\cdot4}$ Terpadiene-3-oxime-6-one ("Nitroso Carvacrol.") By *E. Kremers* and *I. W. Brandel* 248

Progress in alkaloidal chemistry during the year of 1903. By *H. M. Gordin* 256

Proposed Changes in the U. S. P. By *I. W. Brandel* 269

New Remedies, Organic and Inorganic 274

The Most Potent Germicide

We want every druggist in North America to stock Alphozone.

It is positively the most powerful organic germicide and is **safe** for both the pharmacist and the patient. Being non-explosive it is sold in pure condition, and is not mixed with infusorial earth or any other substance.

It is non-poisonous.

It does not deteriorate under ordinary conditions.

It is liberally advertised to physicians, but is **always** supplied through the drug trade. Like all other Stearns Products, every package sold yields its profit to some **retail druggist.**

All jobbers supply Alphozone. Price, per oz., $4.50; ½ oz., $2 30; ¼ oz., $1.20.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for **Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.**

A. H WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,

DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

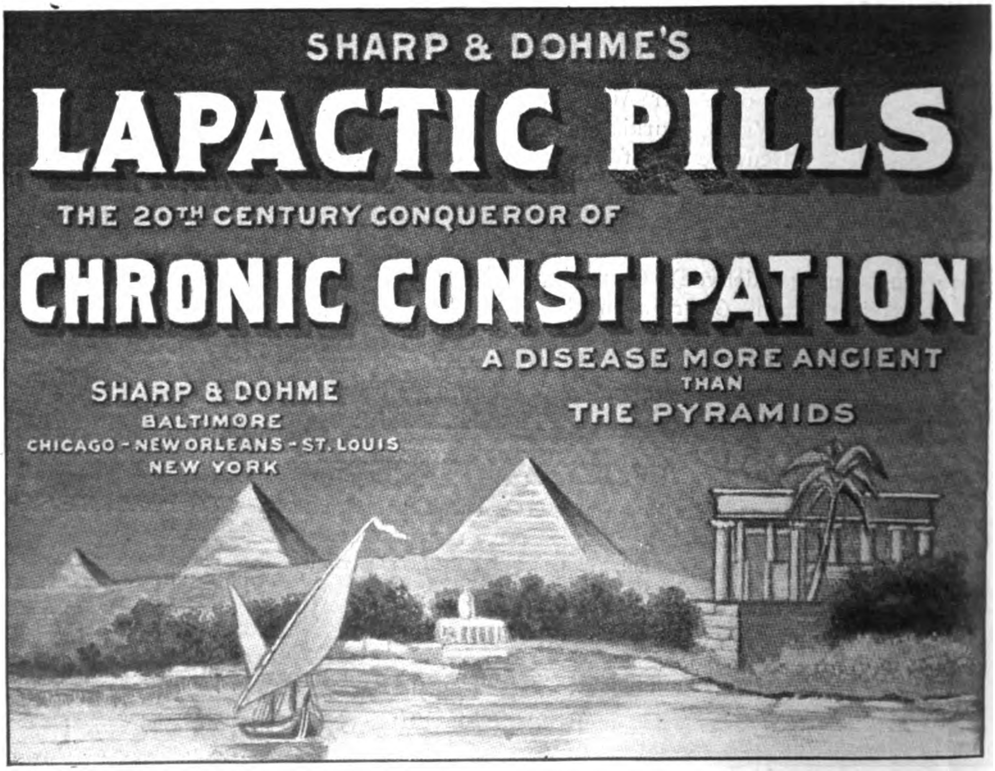
(Compound of stear-amide with hydrocarbons.)

Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 15% water.

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.



SHARP & DOHME'S

LAPACTIC PILLS

THE 20TH CENTURY CONQUEROR OF

CHRONIC CONSTIPATION

A DISEASE MORE ANCIENT
THAN
THE PYRAMIDS

SHARP & DOHME
BALTIMORE
CHICAGO - NEW ORLEANS - ST. LOUIS
NEW YORK

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

... IS ALSO SUPPLIED IN ...

5-Grain Dose Powders

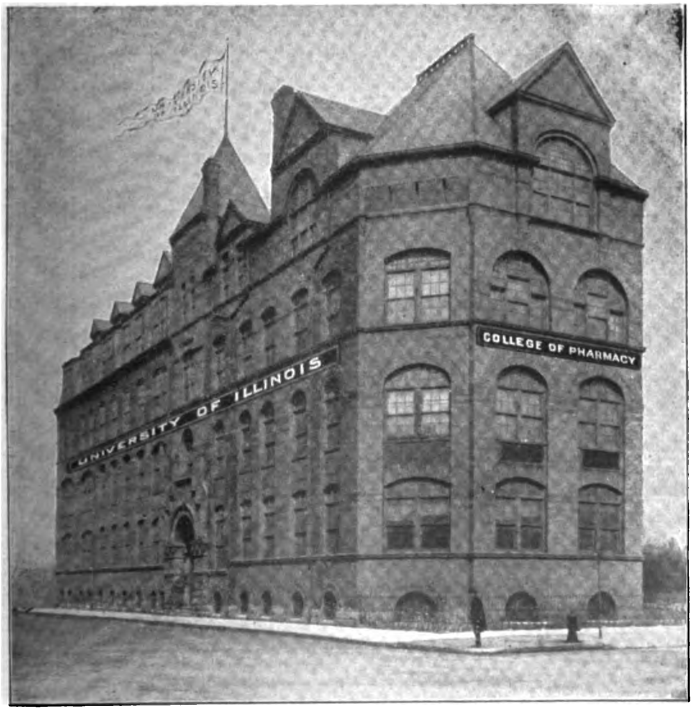
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK



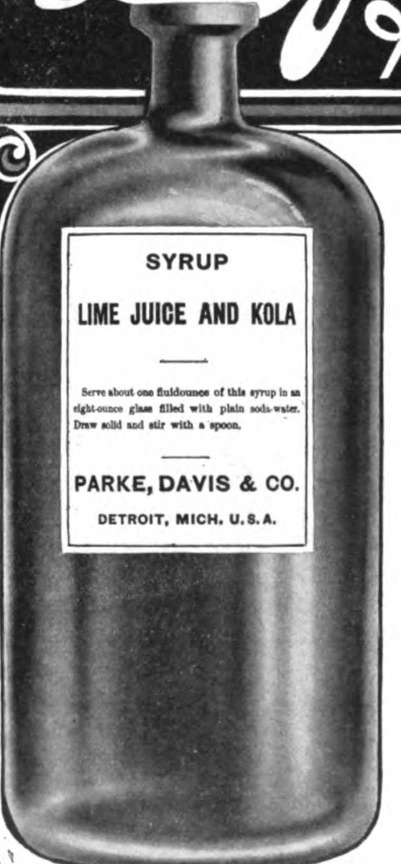
University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

Syrup Lime Juice & Kola


SYRUP
LIME JUICE AND KOLA
Serve about one fluidounce of this syrup in an eight-ounce glass filled with plain soda-water. Draw solid and stir with a spoon.
PARKE, DAVIS & CO.
DETROIT, MICH. U.S.A.

A MONEY-MAKER FOR THE FOUNTAIN

We introduced *Syrup Lime Juice and Kola* to our friends of the drug trade two seasons ago. Its success was instantaneous—it exceeded our most sanguine expectations.

IT HAS CAUGHT THE POPULAR FANCY.

The reason is plain—it makes a delightful beverage, stimulating, refreshing.

Bear in mind that this is not a concentrated extract, but

AN ELEGANT SYRUP, READY FOR DISPENSING.

Include *Syrup Lime Juice and Kola* in your assortment of fountain specialties. Send us an order for a gallon or two now—as a starter. It will stimulate trade.

NET PRICES:

Gallon bottles, each, - -	$1.75
5 gallon lots, per gal., - -	1.60
10 gallon lots, per gal., - -	1.50

Prices of barrel and half barrel lots on application.

We supply attractive literature, which helps create a demand. Write us about it.

PARKE, DAVIS & COMPANY

LABORATORIES: DETROIT, MICH., U.S.A.; WALKERVILLE, ONT.; HOUNSLOW, ENG.
BRANCHES: NEW YORK, CHICAGO, ST. LOUIS, BOSTON, BALTIMORE, NEW ORLEANS, KANSAS CITY,
MINNEAPOLIS, INDIANAPOLIS, MEMPHIS; LONDON, ENG.; MONTREAL, QUE.; SYDNEY, N.S.W.;
ST. PETERSBURG, RUSSIA; SIMLA, INDIA; TOKIO, JAPAN.

Pharmaceutical Review.

Volume 22. JULY, 1904. Number 7.

Drugs of Primitive Peoples.

In his "Medicin der Naturvölker," Dr. Max Bartels has made one of the first attempts to bridge over the chasm that exists between the history of medical science on the one hand and the import of popular medication on the other. While written primarily for the student of medical history, certain chapters are of special import to the student of the history of drugs and of pharmacy in general. Moreover the entire work is a valuable contribution to ethnology and as such will appeal to all students. Thanks to the free access which the author enjoyed to several important ethnological museums, the book is well illustrated.

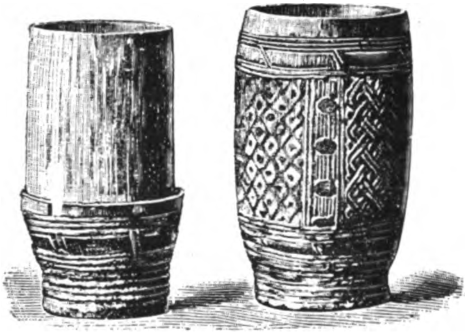


Fig. 1.

A medicine container carved from wood. Bonerate (A small island south of the Celebes Islands, E. I.), Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

Part V of the book is devoted to "Medicaments and their application." In as many chapters, the following subjects are discussed: 1) Medicinal drugs; 2) Diseases which are treated with the aid of medicaments; 3) The procuring of the medicaments; 4) Their preparation; 5) Their preservation; 6) The cultivation of medicinal plants; and 7) The administration of medicaments.

With but one exception the knowledge and skill, possessed by the representatives of the primitive peoples who are described in these chapters as practicing this branch of the medical science and art, are those now-a-days attributed to pharmacists in civilized countries. It is, therefore, a condition of primitive pharmacy which here we find described.

With the awakening of interest in matters historical, a translation of these chapters should prove timely and useful. The author does not claim to have exhausted his subject, but fully recognizes that it will take much more time to collect the very widely scattered material from books of travel and from periodic literature. That the publication of these chapters in English may be made the basis for a more exhaustive collection of the literature of drugs, especially of that relating to the North American Indian, the Esquimaux, and the native tribes of the Philippines is the wish of the writer. Persons in possession of such material, especially editors of pharmaceutical journals, will greatly oblige the writer by sending documents to him as Chairman of the Historical Committee of the American Pharmaceutical Association. It is also to be hoped that some of drugs still used by the Indians may be collected and preserved for a pharmaceutical museum to be established by our national association.

1. Medicinal Drugs.

"Numerous communications have been made by travellers and botanists concerning all kinds of barks, fruits and leaves which they have found in the materia medica of uncivilized peoples. It is not my intention, however, to enumerate the lists of these. Some of these medicinal drugs, either from the same or related species, may be found in our apothecary shops; of others the physiological action is partly unknown; in part we are not yet informed as to their chemical constituents. Their enumeration would consume time, but be without object or use. The pharmacologist, however, should be urged to study them, for many a therapeutic gem may be hidden among these drugs. To us the acquaintance of these natural remedies was of importance because they are an aid in passing judgement on the diagnostic knowledge of the peoples still living in a state of nature. Some of the results thus obtained can not be passed over in silence.

"The number of these medicinal drugs, the lists of which have been accessible, is very variable. And yet it may be assumed that the observers were intent upon collecting all the facts that might come to their knowledge. We must naturally pass by such notices which mention only in a casual way that such and such a plant is being used therapeutically. Only compiled lists can here be considered.

"First of all, we have the list of the Easter Island.[2] The native pharmacopœia of Thomson[3] is justly regarded as very limited for it enumerates only arrow root, a thistle and a species of nightshade. Decidedly more numerous are the medicinal plants used by the Karok[4] Indians in northern California, namely thirteen species. Eighteen species are enumerated as being used by the Twana, Chemakum and Klallam Indians.[5] In the Seranglao and Gorong Archipelago[6] twenty-five drugs are reported as being used.[7] Bowditch[8] enumerates thirty-four used by the Ashantie.[9]

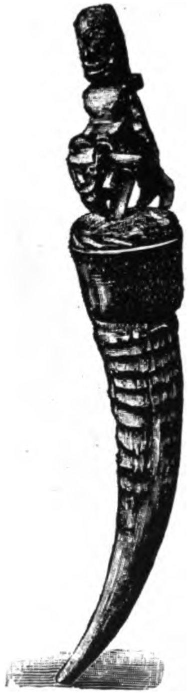


Fig. 2.

Purminakun, a goats' horn containing medicine. The cover represents a human form, termed Ganagana, riding on another. Collected from the Battas of Sumatra. Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

"The Dutch expedition to Central Sumatra[10] found thirty-eight drugs in use.[11] Hoffmann[12] enumerates fifty-six medicinal drugs in use by the Chippewas,[13] and Paulitschke[14] found sixty-five in use by the Harrari,[15] of which three were used for veterinary purposes. Most numerous is the list of Schoolcraft,[16] who enumerates eighty-nine medicinal drugs. These are used by the Northamerican Indians, particularly by the Dacotas, the Creek Indians, the Winnebagos and Chippewas.

"Among the drugs enumerated in these lists we find such as are mentioned by Paulini in his "heylsame Dreck-Apotheke." This can not surprise us for even to-day we find similar medicaments among our own popular remedies. We might rather expect to find more such remedies among peoples still in a state of nature. Suffice it to call attention to but a few. The excrements of the *Dalai Lama.* Pills made from excrements of pigeons were observed among the Indians of southern California.[17] Faeces are used for poultices by the Dieyerie in South Australia.[18] Human urine or that of horses is used as potion by several tribes: the former in Canada, the latter by the Annamites.[19] In Persia bear urine is frequently called for in apothecary shops.[20] Among the natives of South Australia the

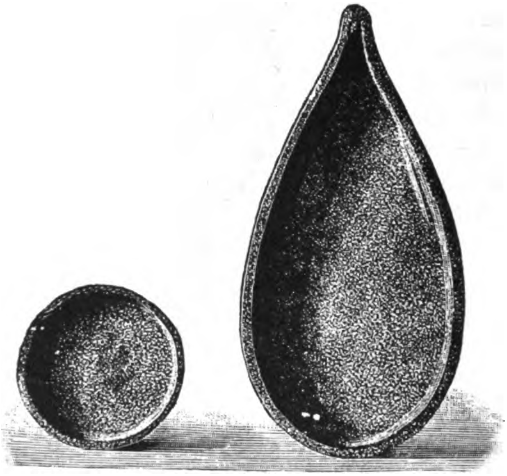


Fig. 3.

Medicine spoons of the Singhalese (Ceylon). Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

urine of women is highly esteemed as an external remedy for all sorts of ailments.[21]

"In Annam[19] the first teeth of children when fallen out are made up into medicaments. According to the statement of a native, the Indians of Canada occasionally used boiled human flesh as medicine. They also use human blood internally. The latter is likewise employed by the Ganguella negroes[23] of Africa visited by Serpa Pinto. The same negroes also occasionally use animal blood. The internal administration of human blood is reported to be very common among the wild tribes of the Maclay river in Queensland.[24] The method by means of which this blood is obtained is described as follows: 'The wife of the patient secures a cupshaped conjeboi leaf and a strong cord made by firmly braiding strips of oppossum hide. This is rubbed against the gums by pulling it to and fro until they are lacerated and bleed profusely. The blood she spits into the conjeboi leaf, continuing the operation until she has a considerable amount. The medicament thus obtained is swallowed by the husband.' These people also take their own blood, but in this case it is previously boiled.

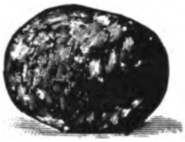


Fig. 4.

Batu bawi, a stone supposed to be obtained from the brain of the porcupine. It is used as a headache remedy in the Isle of Flores (Malay Arch.). Collected by Adrian Jacobsen. Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

"In this account saliva should not be omitted which still plays an important role among the popular remedies of our own people. We do not learn, however, whether among the primitive peoples the saliva must be supplied before breakfast as is the case with our rural people. Its use has been observed principally in Nias.[25] Mixed with slaked lime, it is applied to the forehead to relieve headache. It is necessary, however, that it be supplied by some one who has chewed sirih. The same remedy without the lime is supposed to relieve the itching of eruptions of the skin. In cases of fever sirih-saliva is also applied externally.

"In addition to the above human remedies, there are other remarkable drugs from the animal kingdom. For example, fish oil is used by the "Ostjaken"[26] against constipation. The turtle-dove, charred with its feathers is used against all kinds of diseases in Laos. Scraped bones from faun and from the Axis-deer are used in Tonkin against *Incontinentia urinae* and *spermatorrhea.*[28] The bones and teeth of the tiger are used by the Annamites against whooping cough. The fluid from the head of an ape is used in Laos against smallpox. The "Ostjaken" praise the heart and gall of the polar bear as remedies against childrens' diseases and syphilis. To relieve perspiring feet the Annamites recommend shoes made from the skin of an elephant. In the island Flores a small round stone (Fig. 4) is used as a remedy for headache. It is supposed to be obtained from the brain of a porcupine.

"Of the medicaments of the Marutse in south Africa Holub[29] makes the following statement: 'Of animal substances are used powdered bone, powdered burnt bone, the scales of the Pangolin, the glands of certain mamalia containing odoriferous substances, animal excrements etc. Bracelets and breast bands made from the fat of the buffalo are said not only to drive out certain diseases but also to protect against human persecution.' "

---

[1] Th. Grieber's Verlag. Leipsig. 1898.
A first attempt. unknown to the author, was made by A. Bouchinet: Les états primitifs de la médicine. Paris. 1891.

[2] An island in the south Pacific, claimed by Chile.

[3] Thomson:—The story of New Zealand, past and present. London. 1859.

[4] O. T. Mason: The Ray Collection from Hupa Reservation. Ann. Report of the Board of Regents of the Smithsonian Institution for the year 1886. Part I, p. 235.

[5] Myron Eells:—The Twana, Chemakum and Klallam Indians of Washington Territory. Ibidem for the year 1887, Part I, p. 675.

[6] The Seranglao and Goronv islands are in the eastern part of the Malay archipelago, between Serang and and New Guinea.

[7] J. G. F. Riedel:—1) De sluik-en kroesharige Rassen tuschen Selebes en Papua. s'Gravenhage, 1886. 2) De Topantunuasu of vorsprackelijke volksstammen van Central Selebes. s'Gravenhage, 1886.

[8] T. E. Bowditch: — Mission der Englisch-Afrikanischen Compagnie von Cape Coast Castle nach Ashantee u. s. w. (Museum der neuesten und interessanten Reisebeschreibungen für gebildete Leser. Vollständig nach den Original-Ausgaben. XIV. Band.) Wien. 1826.

[9] A negro tribe in Upper Guinea, W. Africa.

[10] A Dutch island of the Malay Arch.

[11] A. L. van Hasselt. Volksbeschrijving van Midden Sumatra. Leiden. 1882.

[12] W. J. Hoffmann. The Mide 'Wiwin or Grand Medicine Society of the Ojibwa. Washington. 1892.

[13] An Indian tribe in northern Minnesota and Canada.

[14] P. Paulitschke: — Beiträge sur Ethnographie und Anthropologie der Somâl, Galla and Harirl. Leipsig. 1886.

[15] The inhabitants of Harâr, a city in eastern Central Africa.

[16] H. R. Schoolcraft: Historical and statistical information respecting the history, condition and prospect of the Indian tribes of the U. S. (Ethnological researches respecting the Red Man of America.). Parts I—V. Philadelphia. 1851—1855.

[17] H. H. Bancroft:—The native races of the Pacific States of North America. Vol. I. N. Y. 1875.

[18] N. von Miklucho-Maclay;—Zeitschrift für Ethnologie, Bd. 12, p. 85 (Berlin, 1880); Bd. 14, pp. 26—29.

[19] Inhabitants of Annam, an empire of eastern Asia, under French protection.
See Landes:—Notes sur les moeurs et superstitions populaires des Annamites. Cochinchine française: Excursions et Reconnaissances, No. 6, Saigon, 1880, pp. 447 ff.

[20] J. E. Polak:—Persien, das Land und seine Bewohner. Leipsig. 1865. Band II.

[21] Taplin:—South-Australia (?).

[22] Seventh Report on the northwestern tribes of Canada. Brit. Assn. Adv. Sc. London. 1891.
E. Petitot:—Traditions Indiennes du Canada. Nord-Austr. Textes originaux et traditions littèrale. Alençon. 1887.

[23] In Caguingue, Central Africa.

[24] See 21, pp. 106 and 107.

[25] An island on the west coast of Sumatra.
See E. Modigliani:—Un viaggio a Nias. Milano. 1890.
H. von Rosenberg:—Der Malayische Archipel. Land und Leute. Leipzig. 1878.

[26] P. S. Pallas:—Reise durch verschiedene Provinzen des Russischen Reiches. I. St. Petersburg. 1771.

[27] States in Indo-China. subject to Siam.
See E. Aymonier:—Notes sur les Lavs (Cochinchine Française: Excursions et Reconnaissances. No. 21. (IX.) Saigon. 1888.); and A. Bastian. Die Völker des östlichen Asiens.
Studien und Reisen. Dritter Band. Reisen in Siam im Jahre 1863. Jena. 1867.

[28] E. Bronsmiche: Aperçu général de l'histoire naturelle du Tonkin. (Excursions et Reconnaissances. No. 30. (XIII.) Saigon. 1886. p. 176.)

[29] E. Holub:—Sieben Jahre in Süd-Afrika. (1872—1879.) Band I. Wien. 1881.

$\Delta^{1.4}$ Terpadiene-3-oxime-6-one.*

("Nitroso Carvacrol".)

By *E. Kremers* and *I. W. Brandel.*

History.

According to Schiff[1], Paterno and Canzoneri[2] were the first to prepare "Nitrosothymol aus Campher."[3] In the same year it was prepared by Paterno and Spica[4] from "Cumothymol."[5] They found the compound prepared from carvacrol, from cumin alcohol, agreed in its properties with that from carvacrol, obtained from camphor.[6] The identity of carvacrol from various sources was not well established at that time for the authors express their intention to continue their study of the "isomeric thymols."

In 1891 Mazzara and Plancher[7] prepared nitrosocarvacrol ("Carvacrolchinonoxim") according to Walker's method for preparing nitrosophenols. While engaged in a comparative study of the isomeric amidothymol and amidocarvacrol, Wallach and Neumann,[8] in 1895 had occasion to prepare nitrosocarvacrol as an intermediate compound between carvacrol and amidocarvacrol, but did not study its properties.

---

* In a previous article on an isomer of this substance, the so-called nitrosothymol (Pharm. Archives, 4, p. 107), a mistake in the title was made. It should have read $\Delta^{1.4}$ Terpadiene-3-one-6-oxime.

This account is based on a thesis for the degree of Bachelor of Science by Miss S. Swarthout (U. W. 1902), who did a part of the experimental work.

[1] Ber. d. d. Chem. Ges. 12, p. 388.

[2] Gaz. chim., 8, p. 501; also Chem. Centralbl. 50, p. 247.

[3] I. "Nitrosothymol aus Campher" is Nitrosocarvacrol according to Beilstein, 3rd ed. vol. 2, p. 767. Carvacrol is obtained from camphor according to Kekulé and Fleischer (Ber. 6, p. 934) by heating it with iodine. Comp. Claus, Journ. prakt. Chem. 25, p. 264, and Schweizer, Journ. prakt. Chem. 26, p. 118); or from bromcamphor and zinc chloride (Schiff, Ber. 13, p. 1407; Comp. also Wallach, Ber. 28, p. 1116).
II. Camphothymol (Schiff, Ber. 12, p. 384) appears to be another synonym for "Thymol aus Camphor" or carvacrol.
III. "Thymotinsaeure" of Naquet? (Schiff, Ber. 12, p. 384).

[4] Gazz. Chim. 8, p. 508; also Chem. Centralbl. 50, p. 247.

[5] A "thymol" (carvacrol) prepared from cymene from cumin alcohol, through its sulphonic acid. The phenol "ein bei 233° siedendes Thymol (Schiff, Ber. 12, p. 384) obtained by fusing cymene sulphonic acid with potassa, is carvacrol, an insomer of thymol. (Beilstein, 3rd ed. 2, p. 766). Before the term carvacrol prevailed, phenols $C_{10}H_{14}O$ were evidently regarded as "thymols" (Comp. Schiff above) or as "isomeric thymols."

[6] Schiff, Ber. d. d. Chem. Ges. 12, p. 384.

[7] Gazz. chim. 21, p. 155, from Ber. d. d. Chem. Ges. 24, p. 829.

[8] Ber., 28, p. 1660.

In 1896 Plancher[9] studied the action of phenylhydrazine on nitrosophenols and included nitrosocarvacrol in his observations.

While engaged in the study of the inversion of carvone to carvacrol, Klages[10] in 1899 devised[11] a simpler and more satisfactory method for the preparation of nitrosocarvacrol as a means of identifying the phenol.

Methods of Formation and Preparation.

I. By the action of nitrous acid on caravrol, $C_{10}H_{13}OH + HONO = C_{10}H_{12}(NO)OH$, and a subsequent rearrangement to $C_{10}H_{12}(NOH)O$.

a. Paterno and Canzoneri[12] who in 1878 were the first to prepare "Nitrosothymol from Camphothymol" (nitrosocarvacrol), evidently employed the same method devised by Schiff for the preparation of nitrosothymol three years before.[13] Applied to carvacrol, this method is as follows:

> 40 grams of carvacrol are dissolved in a dilute solution of potassa and poured into a solution of 40 grams of potassium nitrite in 18 to 20 liters of water. To this solution, 60 grams of concentrated sulphuric acid, diluted with one liter of water, are added, while stirring. A yellow to brown crystalline magma results, which is filtered off.

When repeated, using one-tenth of the above amounts, 2.79 grams and 2.97 grams were obtained, which amounts correspond to 58.48 and 62.23 percent respectively of the theoretical yield. The compound thus obtained turned a deep reddish brown upon drying.

b. Liebermann and Ilinski[14] in 1885 slightly modified this process in the preparation of nitrosothymol.

> To a solution of 25 grams of sodium nitrite in 9 liters of water, first a solution of 75 cc. of concentrated sulphuric acid in 1 liter of water and then cautiously while stirring, a solution of 50 grams of thymol and 35 grams of potassa in ½ liter of water are added.

---

[9] Gazz. Chim. 25, p. 379; from Ber., 29, p. 294.

[10] Ber., 32, p. 1516.

[11] More correctly he adapted Thiele's method (see Prep. I. c).

[12] Gazz. Chim., 1878, p. 501; from Chem. Centralbl., 50, p. 247; also Ber., 12, p. 858.

[13] Ber., 8, p. 1500.

[14] Ber., 18, 3194.

When applied to carvacrol, using one-tenth of the above amounts, 3.25 grams and 3.15 grams were obtained, corresponding to 54.33 and 52.84 percent respectively of the theoretical amount. This was a very dark dirty looking product.

c. Klages[15] in 1899 further modified this method:

> One part of carvacrol is dissolved in four times the amount of alcoholic hydrochloric acid, saturated at zero degrees, the solution cooled with ice and then a concentrated solution of sodium nitrite added drop by drop. After a few minutes, the whole mass stiffens to a thick magna of nitrosocompound. The compound is washed with water and crystallized from dilute alcohol. The crystals are washed with ligroin in which they are almost insoluble.

Using ten grams of carvacrol, 6.95 and 7.25 grams were obtained corresponding to 58.34 and 50.8 percent respectively of the theoretical yield. If the compound is filtered immediately, a nice compound of a yellowish brown color results.

This method is practically identical with that employed by Johannes Thiele[16] in the preparation of tetramethyl-ethylene-nitroso-chloride.

> The tetramethyl-ethylene is dissolved in concentrated alcoholic hydrochloric acid and a concentrated solution of sodium nitrite added drop by drop, keeping the mixture cold. The liquid turns blue, or green with excess of nitrite and is precipitated as a blue compound upon dilution with water. It is washed with water and dried on porcelain plates.

d. On account of the inconvenience of saturating alcohol of zero degrees with hydrochloric acid, a modification of this method was tried by means of which a fine product and a good yield were obtained.

> 5 grams of carvacrol are dissolved in a mixture of 25 cc. concentrated hydrochloric acid and 22 cc. of 95 p. c. alcohol. The carvacrol is just soluble in this mixture. The solution is placed in a freezing mixture and crystals of

---

[15] Ber., 32, p. 1518.
[16] Ber., 27, p. 455.

sodium nitrite are gradually added. The solution first becomes a light green, then very dark green and finally, after a very few minutes, solidifies to a bluish mass. This is transferred to a beaker containing one liter of water and stirred when the compound becomes light yellow. The product is filtered, washed with water and dried on a porous plate for twenty-four hours. It should be filtered as soon as possible because if left standing in water it decomposes and turns brownish in color.

The best results were obtained using 40 cc. of concentrated hydrochloric acid and 50 cc. of 95 p. c. alcohol. Using 5 grams of carvacrol, 5.25 grams, 5.15 grams and 5.22 grams of nitrosocarvacrol were obtained corresponding to 88.1, 86.3 and 87.5 percent respectively of the theoretical yield. A nice pale yellow compound results.

e. Application of Baeyer's method for preparing nitrosopulegone.[17]

2 cc. of pulegone are mixed with 2 cc. of ligroin and 1 cc. of amyl nitrite and cooled with ice. A very small amount of concentrated hydrochloric acid is added by moistening a glass rod with the acid and dipping the rod into the solution. After 20—30 seconds, a turbidity appears and it stiffens to a magma of very fine needles. After twenty minutes it is filtered, washed with ligroin and then with ether.

This method was tried with no satisfactory results.

II. By the action of amyl nitrite and sodium ethylate on carvacrol.

a. Mazzara and Plancher[18] in 1891 prepared "carvacrolchinoxim" (Nitrosocarvacrol) in the same way that Walker[19] prepared nitrosophenols generally.

50 grams of carvacrol and 15 grams of sodium are dissolved in the least possible amount of alcohol; 35 grams of amyl nitrite are allowed to act upon it in a freezing mixture. After the evaporation of the alcohol, the residue is dissolved in water, filtered and precipitated with sulphuric acid. The residue is dissolved in ammonia water and again

---

[17] Ber. 28, p. 658.

[18] Gass. Chim., 21, p. 155; from Ber. 24, p. 829.

[19] Ber. 17, p. 400.

precipitated with sulphuric acid. It is crystallized from benzol.

This method was not repeated, having been found highly unsatisfactory when applied to thymol.

b. Wallach and Neumann[20] in 1895 obtained nitrosocarvacrol by a slight modification of the above process.

A concentrated solution of one molecule of sodium ethylate in alcohol, one molecule of carvacrol and one molecule of amyl nitrite are mixed. When put in a shallow dish in a desiccator, sodium nitrosocarvacrol separates out in red crystals which are filtered off, washed with ether and dissolved in water. Acetic acid is used to precipitate the nitrosocarvacrol from the solution. The pale yellow crystals are recrystallized from methyl alcohol.

The modification was not repeated, for the same reason.

Physical Properties.

Purification.

Wallach and Neumann[21] recrystallized nitrosocarvacrol from methyl alcohol. Mazzara and Plancher[22] recrystallized it from benzol. Klages[23] used diluted alcohol.

When recrystallized from hot ethyl alcohol, a yellow crystalline product results. The alcohol takes out the coloring matter much more readily than benzol. It is slightly soluble in hot water, from which it crystallizes in beautiful pale yellow needles.

Melting Point.

Paterno and Canzoneri[24] who first prepared nitrosocarvacrol, gave 153° as the melting point. Wallach and Neumann[25] observed 153° after recrystallization from methyl alcohol. Klages[26] observed 153° as the melting point after it was recrystallized from diluted alcohol.

After a second purification from benzol 151° was observed as the melting point and upon subsequent recrystallization from hot ethyl alcohol, the melting point rose to 153°.

---

[20] Ber. 28, p. 1661.
[21] Ber. 28, p. 1661.
[22] Gazz. Chim. 21, II, p. 155; Ber. 24, p. 829.
[23] Ber. 32, p. 1518.
[24] Gazz. Chim. 1878, p. 50; Chem. Centralbl., 50, p. 247; Ber. 12, p. 883.
[25] Ber. 28, p. 1661.
[26] Ber. 32, p. 1518.

Solubility.

Paterno and Canzoneri[27] found it to be readily soluble in alcohol, ether, benzol and chloroform. Klages[28] found it to be insoluble in ligroin.

It is soluble in alkalies with a red color; also slightly in hot water.

Form and Color.

Paterno and Canzoneri[27] obtained nitrosocarvacrol in yellow prisms, Wallach and Neumann[28] as pale yellow crystals, Klages[29] as yellow needles.

Crystallized from hot ethyl alcohol, it was obtained as minute pale yellow needles. When recrystallized from benzol, the crystals are somewhat darker in color. If allowed to crystallize from benzol slowly, fairly large laminae of a yellowish-brown color result.

Chemical Properties.

Molecular Weight.

Taking the molecular weight of nitrosocarvacrol by the boiling point method in absolute alcohol, it was found that the molecular weight decreases with the concentration of the solution as is shown by the following table:

Wt. of solvent.	Wt. of Subst.	Parts per 100.	Rise in Temp.	Mol. Wt.
20.219	0.530	2.621	0.105	287.1
20.219	1.310	6.479	0.348	214.2
20.219	1.880	9.298	0.522	204.6

The formula used in calculating the molecular weight was $M = K\frac{S}{L\Delta}$; where K is the constant for the solvent; s, the number of grams of substance in solution; Δ, the rise in temperature, and L, the number of grams of solvent. K in case of absolute alcohol = 1150.

Taking the molecular weight by the boiling point method with chloroform, dried over anhydrous copper sulphate, the molecular weight of nitrosocarvacrol increases with the concentration of the solution. (K=3660.) This is shown in the following tables:

---

[27] Ber. 12, p. 888.
[28] Ber. 82, p. 1518.
[27] Ber. 12, p. 888.
[28] Ber. 28, p. 1661.
[29] Ber. 82, p. 1518.

Wt. of solvent.	Wt. of Subst.	Parts per 100.	Rise in Temp.	Mol. Wt.
34.760	0.820	2.359	0.375	211.3
34.760	1.489	4.284	0.643	218.7
34.760	2.178	6.266	0.870	247.0

The results of a second experiment were as follows:

33.811	0.788	2.330	0.378	225.6
33.811	1.367	4.042	0.670	231.0
33.811	2.162	6.394	0.953	254.3

In case of benzol, C. P. dried over sodium, the molecular weight generally increased with the concentration of the solution. The following tables show this. (K=2670.)

Wt. of solvent.	Wt. of Subst.	Parts per 100.	Rise in Temp.	Mol. Wt.
20.684	0.805	3.884	0.378	274.4
20.684	1.405	6.780	0.580	312.9
20.684	2.148	10.365	0.790	349.8
16.319	0.435	2.666	0.201	354.8
16.319	0.794	4.886	0.335	387.8
16.319	1.236	7.594	0.470	430.2

That nitrosothymol behaves in a similar manner toward the different solvents can be seen from the following tables:

Wt. of solvent.	Wt. of Subst.	Parts per 100.	Rise in Temp.	Mol. Wt.
Absolute Alcohol.				
18.4103	0.2142	1.1634	0.030	446.3
18.4103	0.5325	2.8924	0.082	405.6
18.4103	0.8567	4.1119	0.162	300.0
16.9117	0.3492	2.0648	0.06	395.7
16.9117	0.6737	3.9836	0.145	315.9
16.9117	1.0675	6.2530	0.270	266.3
Chloroform.				
34.4828	0.2375	0.6887	0.145	173.8
34.4828	0.5595	1.6225	0.320	185.5
34.4828	0.8340	2.4185	0.445	199.0
33.6553	0.2065	0.6138	0.145	154.9
33.6553	0.4048	1.2027	0.230	191.4
33.6553	0.7315	1.8763	0.322	213.5
Benzol.				
19.65929	0.23759	1.2029	0.1	321.2
19.65929	0.44089	2.2422	0.17	352.2
19.65929	0.81969	4.159	0.32	347.1
21.92369	0.2814	1.2834	0.103	332.7
21.92369	0.5575	2.5429	0.208	359.7
21.92369	0.80609	3.6764	0.298	427.6

The results of the molecular weight determinations of nitrosocarvacrol and nitrosothymol can better be compared in the following table:

NITROSOTHYMOL.			NITROSOCARVACROL.
Parts per 100,	**Mol. Wt.**	**Mol. Wt.**	**Parts per 100.**
	Absolute Alcohol.		
1.1634	446.3	287.1	2.62101
2.8924	405.6	214.2	6.47902
4.1119	300.0	204.6	9.29811
	Chloroform.		
0.6887	173.8	211.3	2.3591
1.6225	185.5	218.7	4.2842
2.4185	199.0	247.0	6.2663
	Chloroform.		
0.6138	154.9	225.6	2.330
1.2027	191.4	231.0	4.042
1.8763	213.5	254.3	6.394
	Benzol.		
1.2029	321.2	274.45	3.8846
2.2422	352.2	312.91	6.7801
4.1590	347.1	349.86	11.3657
1.2834	332.7	354.8	2.666
2.5429	359.72	387.8	4.886
3.6764	427.6	430.2	7.594

As can be seen from the foregoing tables the behavior of nitrosocarvacrol and nitrosothymol in the respective solvents is similar. With absolute alcohol as a solvent, the molecular weight of both decreases with the concentration of the solution. On the other hand, taking benzol and chloroform as the solvents, there is a tendency for the molecular weight to increase with the concentration of the solution.

From the results obtained, if the usual argument were to be applied, it would be said that there is a tendency for the nitroso derivatives of thymol and carvacrol to form double molecules in solution. But in only one case, namely, benzol, the molecular weight obtained corresponded to the calculated double molecule of nitrosothymol or carvacrol.

$$C_{10}H_{12}O.NOH=178.63 \text{ and } (C_{10}H_{12}O.NOH)_2=359.26.$$

The fluctuations of the "molecular weight" in the different solvents may be due to the presence of both single and double molecules in solution or to combinations of dissolved substance with solvent, or to both. The results obtained, therefore, are not the true molecular-weights of either a single or a double molecule, but serve to illustrate, in a measure, the nature of the chemical changes which take place in these solutions.

(*To be continued.*)

Progress in Alkaloidal Chemistry During the Year of 1903.*

By *H. M. Gordin.*

A new synthesis of **choline** has been discovered by Krüger and Bergell. It consists in heating tri-methylamino-bromethyl bromide four hours with two and a half times its amount of water under pressure to 160°.

$$Br(CH_3)_3N.CH_2.CH_2.Br = (CH_3)_3N.CH_2.CH_2.OH + HBr.$$

On converting the choline hydrobromide thus obtained into the corresponding hydrochloride (by means of silver chloride) and treating the latter with platinum tetrachloride or gold trichloride the characteristic double salts of choline were obtained. The melting point of these salts varies with the method of heating. Thus the gold salt when quickly heated melts at 249°, but heated slowly it melts at 243—244°.

The trimethyl-amino-bromethyl bromide was obtained by passing trimethylamine into ethylene bromide at 110—120°

(Ber. Dtsch. chem. Ges. 36, 2601.)

Beckurts and Frerichs find that the four crystalline alkaloids of angostura bark, cusparine, gallipine, gallipidine and cusparidine, can be separated from the amorphous bases of the bark by treating the ethereal extract with acetic or tartaric acid. The crystallized alkaloids form salts with these acids that are stable at least in the cold, whereas the amorphous bases do not form acetates or tartrates. The complete separation of the crystallized alkaloids from each other is very difficult.

Gallipidine $C_{19}H_{19}NO_3$ is a tertiary base giving with methyl iodide an addition product which potassium hydrate converts into methyl gallipidine. Pure gallipidine forms colorless salts and melts at 113°. The yellow color of its salts is generally due to the presence of gallipine and disappears when gallipidine is treated with nascent hydrogen.

Cusparine $C_{20}H_{19}NO_3$ is also a tertiary base, forming an addition product with methyl iodide. The addition compound when treated with potassium hydrate is converted into methyl cusparine.

---

* Continued from page 214.

On prolonged heating (best in presence of urea) (see following paragraph) cusparine is changed into a new base which melts at 250° and was named pyrocusparine.

On heating with potassium hydrate pyrocusparine forms protocatechuic acid. If cusparine be heated with urea only a short time there is formed besides pyrocusparine another base which melts at 142°.

Nitric acid converts cusparine into nitro cusparine which crystallizes in yellow needles. Cusparine contains one CH_3O-group but no OH-group.

Gallipidine also gives protocatechuic acid when heated with potassium hydrate and, like cusparine, cannot be hydrolyzed.

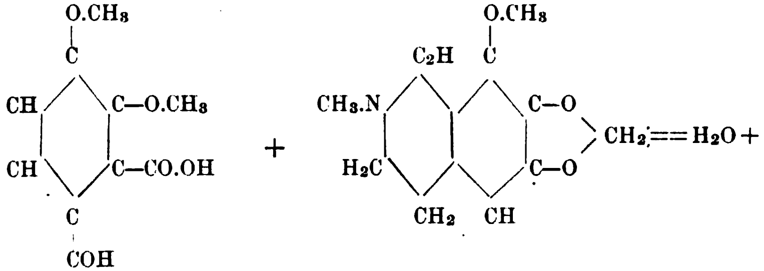
After removal of the above mentioned four crystalline alkaloids there remains in the ethereal mother liquor a mixture of liquid bases. On shaking out this ethereal liquid with diluted hydrochloric acid, then making the aqueous liquid alkaline with ammonia and shaking out with petroleum ether, a fifth crystalline alkaloid, **cuspareine** $C_{34}H_{36}N_5O$ (?), can be obtained. This alkaloid crystallizes in needles, melts at 54° and boils almost without decomposition at 300°. It it even less basic than the amorphous bases and does not combine with acids. It forms a crystalline iodo-methylate. Oxidizing agents color it dark red. The liquid bases, after removal of cuspareine are are volatile at higher temperatures without decomposition. No crystalline salts could be obtained from them.

(Apoth. Ztg. 18, 697.)

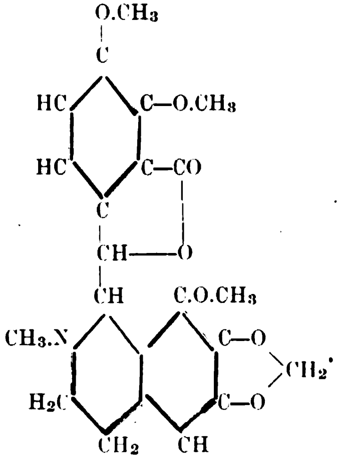
G. Frerichs is studying the action of high temperatures upon oxygen-containing alkaloids. In order to get better yields and purer products it is best not to heat the alkaloids by themselves but to melt them with urea. Thus when narcotine is subjected to dry distillation only a small amount of a crystalline substance is obtained, but on heating the alkaloid with urea the yield of the crystalline substance amounts to about 20—30 per cent of the narcotine taken.

The crystalline substance was at first supposed to contain nitrogen, because in the combustion by Dumas' method a considerable amount of gas was obtained, which was not absorbed by the potassium hydrate, and which was therefore taken for nitrogen. Later it was found that the crystalline substance was meconin, so that the gas unabsorbed by the potassium hydrate must have been some hydrocarbon. The author reiterates the advice of Guareschi and Grande (Chem. Centralbl. 1898, 11. 61) always to test the nitrogen obtained in elementary analyses by Dumas' method for combustible gases. If such are found the estimation of nitrogen is best carried out by Kjeldahl's method.

The formation of meconin from narcotine can be explained by assuming that narcotine is formed from opianic acid and hydrocotarnine, with the elimination of one molecule of water, that the hydrocotarnine residue is completely broken up by the action of the heat and that the opianic acid residue takes up one atom of hydrogen and is converted into meconin.

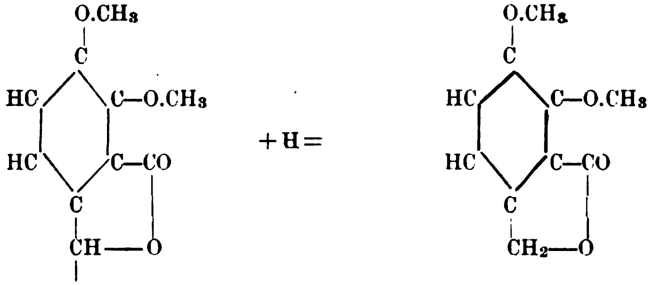


Opianic acid. Hydrocotarnine.



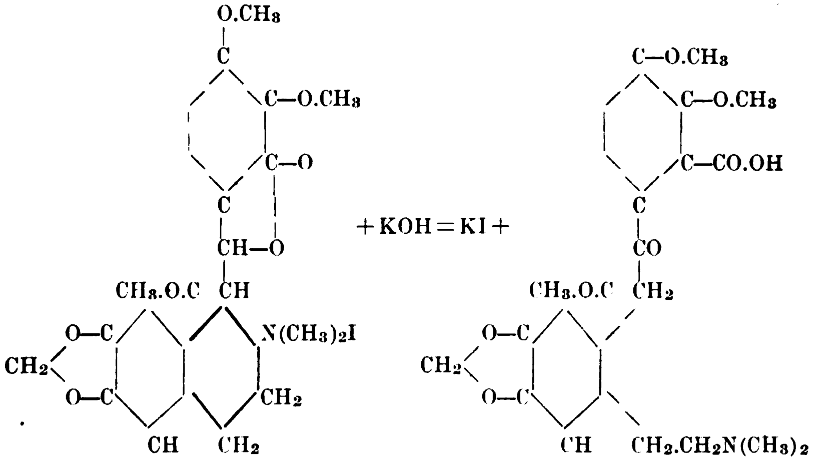
Narcotine.

The conversion of the opianic acid residue into meconin can be shown by following equation:



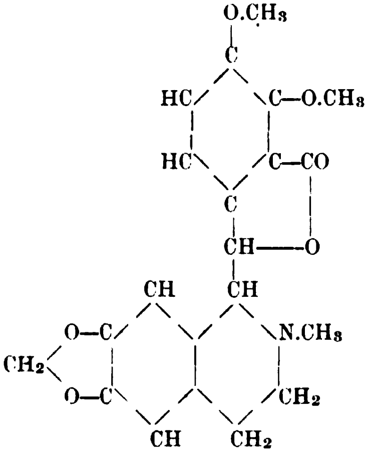
Opianic acid residue. Meconin.

If the temperature of the heating of narcotine with urea is lower or the time of the heating shorter the alkaloid is converted into its isomer gnoscopine which is present in opium and which can also be obtained by heating narcotine to 130° with acetic acid. When heated with urea gnoscopine also forms meconin. The iodo-methylate of gnoscopine differs from the iodo-methylate of narcotine only in being crystalline. When heated with sodium hydrate the gnoscopine methyl iodide, like the corresponding compound of narcotine, gives narceine.



Narcotine-methyliodide. Narceine.

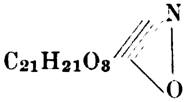
Hydrastine also gives meconin when heated with urea. As hydrastine also contains the opianic acid residue differing from narcotine only in containing one CH_3O-group less in the hydrocotarnine complex of the molecule, the formation of meconine is easily accounted for.



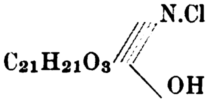
Hydrastine.

(Arch. d. Pharm., 241, 259.)

D. Bruns finds that nothwithstanding the similarity in constitution of **dehydrocorybulbine** with that of dehydrocorydaline and berberine the first of these alkaloids does not form compounds with acetone, chloroform etc. similar to the compounds formed by berberine and dehydrocorydaline. The reason of this difference in behaviour is that free dehydrocorybulbine is not a true ammonium base like the other two alkaloids, but an inner phenol-betaine which by the action of acids is converted into an ammonium salt containing a free OH-group.



Free dehydrocorybulbine.



Dehydrocorybulbine hydrochloride.

When the H of the OH-group in the salts of the dehydrocorybulbine is replaced by the benzoyl group no inner betaine can be formed and the benzoyl dehydrocorybulbine forms an acetone compound, a chloroform compound and a polysulphide like berberine and dehydrocorydaline.

When dehydrocorybulbine is treated with zinc and sulphuric acid it is converted into inactive corybulbine which cannot be split up into active components. The inactive corybulbine is considerably more soluble in alcohol than the natural base. The gold and platinum salts of both the natural and the i-corybulbine could be obtained only by pouring the solutions of the hydrochlorides of the alkaloids into an excess of gold chloride or platinum chloride.

On heating iso-corybulbine with iodine and alcohol under pressure the hydroiodide of dehydroisocorybulbine, $C_{21}H_{21}NO_4.HI$, was obtained. It forms brownish yellow needles more difficultly soluble in water and alcohol than the corresponding dehydrocorybulbine salt and does not melt yet at 260°. Reducing agents ($Zn + H_2SO_4$) convert it into i-corybulbine.

The isomerism of corybulbine and isocorybulbine is due to a difference in the position of the OH-group. This was shown by the fact that upon the elimination of the methyl groups by means of strong hydroiodic acid corydaline, corybulbine and isocorybulbine all gave one and the same apo-corydaline, $C_{18}H_{19}N_4$. It is possible that isocorybulbine does not exist ready made in the plant but is generated during the process of the preparation of the corydalis alkaloids. (Arch. Pharm. 241, 634.)

G. Heyl finds that *Dicentra Formosa* (Andr.) D. C. contains besides tropine the following bases: A base which melts at 168.5—169° and forms a hydrobromide difficultly soluble in alcohol; a base which melts at 142—142.5 and forms a hydrobromide more soluble in alcohol; a base which melts at 136° and a base which forms red salts. The base that melts at 142—142.5 phosphoresces when rubbed like chelidonine but the different melting point and several color reactions show that the base is not identical with chelidonine. There was also found a substance having a bluish fluorescence, insoluble in acids or alkalies and crystallizing in greenish yellow needles. The substance is possibly identical with chelidoxanthine isolated by Schlotterbeck and Watkins from *Stylophorum distichum*.

(Arch. Pharm. 241, 313.)

According to Zwerger the action of bromine upon α- and β-**i-cinchonine** varies with the solvent used. In a mixture of alcohol and chloroform the hydrobromic acid salts of the bases are formed. In carbon tetrachloride unstable perbromides are formed which lose their bromine upon recrystallization from alcohol. In neither case is there an addition of bromine to the unsaturated vinyl group ($CH:CH_2$) supposed to be present in these bases.

Allocinchonine in carbon tetrachloride solution also forms with bromine only a perbromide, but in an alcohol-chloroform solution a trihydrobrom cinchonine, $C_{19}H_{25}Br_3N_2O$, is formed identical with the compound obtainable from cinchonine and hydrobromic acid. The trihydrobromcinchonine gives off two atoms of bromine when titrated by Volhard's method and is converted by ammonia into a monohydrobromcinchonine, $C_{19}H_{23}BrN_2O$.

An estimation of the indices of refraction of equimolecular quantities of the four principal cinchona bases gave nearly the same result (1.3777—1.3785). (Monatsh. Chem. 24, 119.)

Using a more convenient method than the one used by Koenigs and Comstock (Ber. Deutsch. chem. Ges. 17, 1995), A. Christensen obtained the same cinchonine dibromide, $C_{19}H_{22}Br_2N_2O$. The dibromide when treated with zinc and sulphuric acid seems to give hydrocinchonine with evolution of hydrobromic acid. When the dihydrobromide of the cinchonine dibromide is treated with bromine a perbromide is obtained which on boiling with water dissolves to a red liquid having a green fluorescence. If bromine is now added to the solution the fluorescence disappears and upon cooling an orange colored precipitate is formed which is soluble in alcohol and reprecipitated by ether. The aqueous solution of this precipitate has a yellowish green fluorescence and the addition of ammonia to this solution produces a precipitate which is at first red and then becomes violet.

Monobromcinchonine, $C_{19}H_{21}BrN_2O$, was obtained by removing one molecule of hydrobromic acid from cinchonine dibromide by means of potassium hydrate. It differs from the dibromide in being easily soluble in nitric acid. Treated with zinc and sulphuric acid it loses its bromine and is converted into hydrocinchonine, $C_{19}H_{24}N_2O$. The monobromcinchonine is identical with the compound previously obtained by Koenigs and Comstock (Ber. Deutsch. chem. Ges. 20, 2524) and named by them bromdehydrocinchonine. The latter name should therefore be dropped.

A dibrom substitution product of cinchonine cannot be obtained by the direct action of bromine upon cinchonine. The compound obtained by Laurent (Lieb. Ann. 69, 8) is most probably cinchonine dibromide. As to the various oxycinchonines which Kopp (Arch. Pharm. 209, 34) claims to have obtained they should be completely dropped as Kopp's work is unreliable. (J. pr. Chem. 68, 425)

Berthelot and Gaudechon have made some thermochemical investigations upon **quinine** and **quinidine.** The conclusions arrived at are as follows:

1. When freshly precipitated quinine is dissolved in 4 HCl at 19° it liberates 1.5 calories less than when dry anhydrous quinine is used; if the quinine remained in the mother liquor for 5 days the number of calories evolved upon solution in the acid was still less. This must be due either to the formation of different hydrates of the alkaloid or to some intramolecular change.
2. The different monoacid salts of quinine have nearly the same heat of neutralization.
3. The second molecule of acid liberates less heat than the first showing that the two valencies of the alkaloid are not equal to each other.
4. The heat of formation of the solid hydrochloride approaches that of ammonium chloride showing quinine to be a pretty strong base. On comparing the differences in the heats of formation of the sulphate and acetate of quinine with the corresponding differences of the sulphates and acetates of the inorganic bases it is found that quinine is nearly as strong a base as the alkalies.
5. Quinidine has the same heats of formation, neutralization and combustion as quinine.

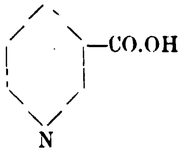
(C. R. de l'Acad. des Sciences 136, 128.)

According to A. Monneyrat many alkaloids form insoluble addition products with iodine bromide IBr. The addition compound of quinine sulphate has the composition $(C_{20}H_{24}N_2O_2.H_2SO_4)I_4Br_4$. The substance is decomposed without melting at 125°. Theobromine and caffeine do not react with iodine bromide.

(C. R. de l'Acad. des Sciences, 136, 1470.)

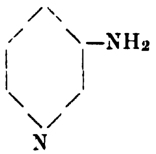
J. O. Braithwaite and H. E. Stevenson were not able to find even a trace of mydriatic alkaloids in *Lactuca virosa.* (Compare Dymond [Pharm. J. [3], 22, 449]. (Pharm. J. [4], 17, 148.]

Aimé Pictet has effected the complete sythesis of **nicotine** by starting from nicotinic acid which is β-pyridine carboxylic acid and which can be made synthetically by oxidizing β-picoline



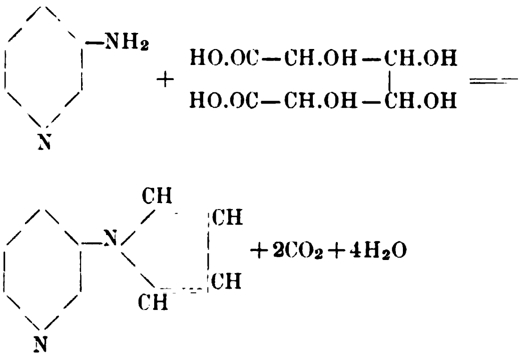
Nicotinic acid.

The nicotinic acid was converted into the acid amide which when treated with sodium hypobromide gave β-amido-pyridine.



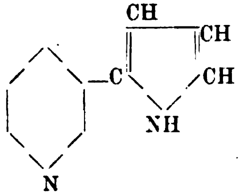
β-amidopyridine.

On heating the amidopyridine with mucic acid, carbon dioxide and water are eliminated and β-pyridyl-N-pyrrol is obtained (in the same way as pyrrol itself can be obtained from mucic acid and ammonia).

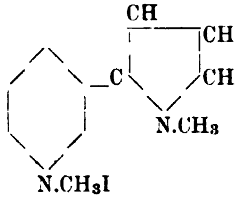


β-pyridyl-N-pyrrol.

When the vapors of this β-pyridyl-N-pyrrol are passed through a red hot tube the substance undergoes an internal rearrangement and is changed into β-pyridyl-α-pyrrol.

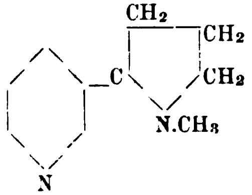


The β-pyridyl-α-pyrrol like pyrrol itself forms a potassium salt in which the K replaces H in the NH-group. When this potassium salt is treated with methyl iodide the iodomethylate of β-pyridyl-N-methyl-α-pyrrol is obtained.



Iodomethylate of β-pyridyl-N-methyl-α-pyrrol.

When this compound is heated with lime the pyridine ring loses methyliodide and upon reducing the resulting substance with tin and hydrochloric acid β-pyridil-N-methyl-α-pyrrolidine is obtained identical with natural nicotine except that the synthetic base is optically inactive.



β-pyridyl-N-methyl-α-pyrrolidine
or nicotine.

By combining the inactive base with d-tartaric acid and then splitting up the tartrate with potassium hydrate l-nicotine was obtained in every respect identical with the natural alkaloid.

(C. R. de l'Acad. des Sciences 137, 860.)

C. Moureu and A. Valeur show that **sparteine** is a ditertiary base, does not contain a CH_3-group attached to N, is monoacid towards litmus and phenolphtalein and diacid towards helianthin.

The formula $C_{15}H_{26}N_2$ established by Stenhouse was corroborated. The alkaloid is not affected by tin and hydrochloric acid; a dihydrosparteine does not exist (compare Ahrens, Ber. Deutsch. chem. Ges. 1887, 2218 both with regard to dihydrosparteine and to the presence of a N-methyl-group). Sparteine does not seem to contain any double linkings. (C. R. de l'Acad. Sciences, 137, 194.)

A. Hilger and W. Merkens find that a two percent solution of sulphuric acid decomposes **solanine** into solanidine, dextrose, crotonic aldehyde and water:

$$2C_{52}H_{97}O_{18}N = 2C_{39}H_{61}O_2N + 3C_6H_{12}O_6 + 2C_4H_6O + 12H_2O$$

Amorphous solanine or so-called solaneine has the following formula: $C_{52}H_{87}O_{13}N$. On standing eight months in contact with aqueous acetone it was converted into crystalline solanine. (Ber. Deutsch. chem. Ges. 36, 3204.)

J. O. Schlotterbeck and H. C. Watkins have isolated the following alkaloids from *Adlumia cirrhosa*. 1. Protopine, $C_{20}H_{19}NO_5$, melting point 204—205°. — 2. β-homochelidonine, $C_{21}H_{23}NO_5$, melting point 159°. — 3. Adlumine $C_{39}H_{39}O_{12}N$ or $C_{39}H_{41}O_{12}N$ melts at 188° contains two CH_3O-groups and one OH-group and has spec. rot. 39.88°. Adlumine is not precipitated by platinum tetrachloride gives an orange colored precipitate which is partly reduced upon recrystallization. — 4. Adlumidine $C_{30}H_{29}O_9N$ melting point 234°. A fifth alkaloid was also obtained in small amount melting at 176—177°. (Pharm. Arch. 6, 17.)

M. Greshoff finds that many alkaloids give difficultly soluble precipitates when treated with sodium nitroprusside, potassium ferrocyanide, potassium ferricyanide and potassium sulphocyanate. Several definite compounds of alkaloids with these reagents were obtained. (Pharm. Weckbl. 40, 541.)

H. Beckurts and G. Frerichs find that on melting with urea some alkaloids, like morphine, strychnine and papaverine are very stable. Narceine forms narceine imide (by the action of NH_3 formed by decomposition of the urea) and an indifferent substance melting at 192°. Berberine gives a crystalline red alkaloid which forms yellow salts with acids. The red alkaloid can be used as an indicator in alkalimetry for ammonia, carbonates and alkalies. It can also be used for titrating alkaloids in the presence of a layer of chloroform (like eosine). (Apoth. Ztg. 48, 697.)

The following reaction for cocaine is proposed by H. Siemssen. When a strong solution of sodium molybdate is added to a solution of a cocaine salt a white precipitate is formed which under the microscope has a light green color. If 0.1 g. cocaine is first saponified by heating with strong sulphuric acid and the liquid diluted with a little water, the addition of sodium molybdate does not produce any precipitate unless a trace of potassium ferrocyanide be added. (Apoth. Ztg. 48, 534.)

According to E. F. Harrison and D. Gair the separation of small quantities of strychnine from large quantities of quinine can be effected by precipitating the quinine as tartrate in very slightly acid solution. The strychnine is left in solution from which it can be extracted by adding ammonia and shaking out with chloroform. To remove the last trace of quinine the strychnine is washed with very small amounts of ether. (Pharm. J. [4], 17, 165.)

According to G. Guérin the identification of strychnine by means of Wenzell's reagent (1 p. MnO_4 in 200 p. H_2SO_4) is reliable only in the absence of other alkaloids and various other organic substances, like citrates, tartrates and sulphocyanates. On the other hand with Mandelin's and Sonnenschein's reagents the above mentioned substances do not interfere. In the potassium dichromate and sulphuric acid test the sulphocyanates do not interfere at all, and the citrates and tartrates give colors that are entirely different from those given by strychnine. (J. Pharm. Chim. [6], 17, 553.)

A. H. Allen and G. E. Scott-Smith give some color reactions of the ipecac alkaloids. With Froehde's reagent emetine gives a dirty green color which upon addition of hydrochloric acid is changed to a light grass green; cephaeline gives a purple color which changes to prussian blue upon addition of hydrochloric acid; psychotrine gives a dark purple which is changed to pale green by hydrochloric acid. The mixed ipecac alkaloids also give the Prussian blue reaction of cephaeline and can, therefore, be easily distinguished from the opium alkaloids. If a solution of the ipecac alkaloids in amyl alcohol or chloroform be shaken out with a little dilute acetic acid and the aqueous solution put into an atmosphere of ammonia the characteristic crystals of psychotrine which soon appear can be easily identified under the microscope. (Pharm. J. [4], 15, 552.)

Emilio Gabutti gives some color reactions of morphine and codeine. Formic aldehyde gives the same color with both alkaloids but chloral and bromal in sulphuric acid solution give a blue-green color with codeine and a violet color with morphine. If the codeine contains some morphine the color is brown violet. By this reaction it is possible to detect morphine in codeine. Dionine (ethyl-morphine) gives the same color as codeine; heroine (diacethyl morphine) gives a brown red color. (Bol. Chim. Farm. 42, 381.)

A. Wangerin describes two new color reactions for narcotine.

1. On heating 10 milligrams of narcotine with twenty drops sulphuric acid and one or two drops of a one per cent solution of cane sugar on the water bath for one minute the liquid becomes at first greenish yellow, then passes through brownish yellow, brown, brown violet and finally becomes intensely violet blue. The color deepens on standing and remains unchanged for several hours.

2. If in the above reaction the cane sugar be replaced by furfural (15 drops to 100 cc. of water) the liquid assumes at first a yellowish-green tint, then passes through brownish-yellow, brown, olive and at last becomes dark blue. The color deepens on standing and then changes to green.

For the identification of narcotine the first reaction is preferable. (Pharm. Ztg. 48, 667.)

According to V. Lenher and W. Titus most alkaloids form double salts with chlorotelluric and and bromotelluric acids, that are similar in composition to the salts of alkaloids with chloroplatinic acid but differ from the latter in not containing water of crystallization. They are made by adding a solution of the alkaloid in hydrochloric or hydrobromic acid to a solution of tellurium oxide in the same acid. The chlorotellurates are yellow, the bromotellurates red. They are stable in the cold but are easily decomposed by heat. Water decomposes them with separation of tellurium oxide but they can be recrystallized from hot dilute acids.

(J. Am. Chem. Soc. 25, 730.)

J. Alloy finds that many alkaloids are precipitated by a neutral solution of uranium nitrate $UO_2(NO_3)_2.6H_2O$. The precipitates are at first amorphous but become crystalline on standing. They are insoluble in water and alcohol. Alkaline carbonates decompose them into free alkaloid and alkaline uranates. With morphine and its salts uranium nitrate gives a red color in the presence of more than five milligrams of alkaloid; with smaller amounts the color is orange red. (Bull. Soc. Chim Paris [3], 29, 610.)

In studying the reactions of the persulphates D. Vitali finds that some alkaloids are precipitated by potassium persulphate, $K_2S_2O_8$, while others are not. With strychnine salts the reaction is so delicate that it can be used for the quantitative estimation of the persulphate. The composition of strychnine persulphate is $(C_{21}H_{22}N_2O_2)_2.H_2S_2O_8.H_2O$. The salt is decomposed by hot water into strychnine sulphate, sulphuric acid and oxygen.

(Boll. Chim. Farm. 42, 273.)

Chicago, Northwestern University School of Pharmacy.

Proposed Changes in the U. S. P.

By *I. W. Brandel.*

AMYL NITRIS.

Amyl Nitrite.1)

*A liquid containing about 80 per cent. of Amyl (principally Isoamyl) Nitrite [$C_5H_{11}NO_2 = 116.78$], together with variable quantities of undetermined compounds.*2)

*It should be kept in small, dark amber-colored and glass-stoppered vials, in a cool and dark place, remote from lights or fire.*3)

*A clear, yellow or pale yellow*4) *liquid, of a peculiar, fruity odor,*5) *and a pungent, aromatic taste.*6)

*Specific gravity: 0.870—0.880 at 15° C. (59° F.).*7)

*Almost insoluble in water; miscible, in all proportions, with alcohol or ether. In alcoholic solution it gradually decomposes with formation of ethyl nitrite and amylic alcohol.*8)

*It is very volatile, even at a low temperature, and is inflammable, burning, with a fawn-colored flame.*9) *At about 96°—99° C. (204.8°—210.2° F.), it boils,*10) *yielding an orange-colored vapor.*

If 1 cc. of normal potassium hydrate V. S. and 10 cc. of water be mixed with a drop of phenolphtalein T. S., then 5 cc. of Amyl Nitrite added, and the tube inverted a few times, the red tint of the alkaline layer should still be perceptible (limit of free acid).11)

On shaking together equal volumes of Amyl Nitrite and potassium hydrate T. S., the aqueous layer should not acquire a deeper tint than pale yellow (limit of aldehyde).[12])

Amyl Nitrite should remain transparent, or nearly so, when exposed to the temperature of melting ice (absence of water).[13])

If 0.26 gm. of Amyl Nitrite, diluted with about 5 cc. of alcohol, be introduced into a nitrometer, followed by 10 cc. of potassium iodide T. S., and afterwards by 10 cc. of normal sulphuric acid V. S., the volume of nitric oxide generated, measured at the ordinary indoor temperature (assumed to be at or near 25° C., or 77° F.), should be about 40 cc. (each cc. indicating about 2 per cent. of pure Amyl Nitrite).[14])

1) This preparation is officinal in the following pharmacopœias: Austr., Belg., Brit., Fenn., Gall., Germ.. Helv., Hung., Ital., Japon.. Ndl. S., Rom., Russ. and U. S.

2) "It consists chiefly of iso-amyl nitrite, $C_5H_{11}NO_2$, but contains also other nitrites of the homologous series." Br. The German Pharmacopœia attempts no definition.

3) It has been suggested* that in as much "As there is no little danger in handling it, the Pharmacopœia should recommend caution." Fenn. and Hung. demand that it be kept over a few crystals of potassium tartrate."

"It deteriorates unless kept in well-stoppered bottles." Br. "It should be preserved with care, and protected from light." (In heavy-faced type.) Ph. G.

4) Yellowish is the descriptive adjective of the Br., and Ph. G. as to color.

5) The Br. describes the odor as fragrant," the Ph. G. as fruit-like.

6) The Br. does not attempt to characterize the taste, the Ph. G. describes it as "burning and spicy."

7) The specific gravity requirements of the U. S., Br. and Ph. G. agree. Those of the other pharmacopœias differ considerably, that of the Ital. being as high as 0.9025.

The specific gravities of isoamyl alcohol and its nitrous ester as recorded by different investigators (see Beilstein for references) are herewith given.

Amyl Alcohol.	Amyl Nitrite.
0.8113 at 18.7° Kopp.	0.902 Hilger.
0.8104 at 20°/4° Brühl.	0.880 at 15° Dunston, Williams.

---

* Digest of Criticism U. S. P.

The observation by Hilger may account for the high requirement of some of the pharmacopœias. The requirement of the U. S , Br. and Ph. G. are in accord with the observations of Dunston and Williams: the higher limit being persumably that of pure amyl nitrite, while the lower limit makes due allowance for presence of unesterified alcohol.

8) "Soluble in alcohol (90 per cent.) in all proportions." Br., otherwise the solubility requirements of the Br. and Ph. G. are identical with those of the U. S. P. The U. S. P. is the only one that calls attention to the chemical change that takes place in the alcoholic solution.

9) No corresponding statement in the Br. "When ignited, amyl nitrite burns with a yellow, luminous and sooty flame." Ph. G.

10) "Submitted to distillation, about 70 per cent. passes over between 194° and 212° F. (90° and 100° C.), the bulb of the thermometer not dipping below the surface of the residual fluid." Br. "Boiling point 97° to 99°." Ph. G.

The boiling points of isoamyl alcohol and its nitrite as recorded by different observers (for references see Beilstein) are herewith tabulated:

Amyl Alcohol.	Amyl Nitrite.
131.6° Kopp.	99° Guthrie.
128.9—129.8° Brühl.	97—98° Chapman.
130° Schiff.	94—95° Hilger.
129.7° (under 760 mm. pressure) Kahlbaum.	

11) The requirements of the limit of acidity of the Br. are restricted to the following statement: "not more than the faintest acid reaction." The Ph. G. requirement reads as follows: "5 ccm. of amyl nitrite shall not neutralize the alkaline reaction of a mixture of 0.1 ccm. ammonia and 1 ccm. of water."

12) The same test is prescribed by the Br. The Ph. G. has the following test: "A mixture of 1.5 ccm. silver nitrate solution, 1.5 ccm. alcohol and a few drops of ammonia water shall not become brown or black if 1 ccm. of amyl nitrite be added and the mixture gently heated."

13) "A small quantity in a test-tube placed in melting ice remains transparent (absence of water)." Br.

"Cooled to 0°, amyl nitrite shall not become turbid." Ph. G.

Concerning the assay of amyl nitrite, Beringer* (1893) suggested that "a control experiment should be directed, using the same quantities of reagents and alcohol and under the same conditions without the amyl nitrite and the volume of any gas generated deducted from that found in the assay."

A blank test showed that the reagents and solvents yielded no gas under the conditions under which the assay is performed and within the required time.

Nagelvoort† in 1895 made the following comment on the assay process: "It seems to me the Pharmacopœia should have referred here to its own data on p. 510. Apparently the Pharmacopœia prescribes such delicate work as gas analyses without noting corrections of the results for variations in temperature and pressure." He also comments on the time limit and other details.

After having made a detailed study of the assay of spirit of nitrous ether, Fischer and Anderson‡ report also on amyl nitrite and its assay. A comparative study of the three methods used, leads them to the following conclusion: "For every day use, the first or gasometric method is the best of these. It is not only the most expeditious, but with the necessary corrections sufficiently accurate results are obtained.

The German Pharmacopœia requires no assay. The Br. prescribes the following method: "A mixture of 5 volumes with sufficient *alcohol* (90 per cent.) to form 100 volumes affords a liquid of which a portion tested in a nitrometer as described under 'Spiritus Aetheris Nitrosi' should yield not less than 6 times its bulk of nitric oxide gas."

Reference to this article reveals the fact that the gas is to be measured "at the normal temperature and pressure," but no formula or table is given for reducing the volume observed under the conditions that happen to prevail to "normal" conditions.

Bearing in mind the criticisms that have been passed and the several suggestions that have been made for the improvement of the assay method, a number of experiments were made. As a result of these experiments, the writer would suggest the following adaptation of the present method:

A solution of about 2 gm. of amyl nitrite, previously neutralized with sodium carbonate if necessary, in sufficient alcohol to make 100 ccm. is prepared. Of this solution 10 ccm. are introduced into a nitrometer (see p. 510 for details of charging), followed by 10 cc. of potassium iodide T. S., and afterwards by 10 cc. of normal sulphuric acid V. S. When the volume of gas has become constant (within 30 to 60 minutes) the number of cc. are read and the percentage of amyl nitrite calculated with the aid of the following formula:

---

* Am. Journ. Pharm., 65, p. 521.
† The Apothecary, 4, p. 99.
‡ Ph. Archives, 1, p. 193.

$$\frac{P \times V \times 0.0131}{19M(1 + 0.003665t)} \text{ in which}$$

P = the barometric pressure,
V = the volume of gas,
M = the weight of amyl nitrite acid used in the assay,
t = the temperature.

When assayed according to the above method "Amyl Nitris" should yield not less than 80 p. c. of amyl nitrite.

In order to show the influence of the corrections, the following results are appended:

Wt. of Amylnitrite.	Cc. of gas.	Bar. Press.	Temp.	P. c of nitrite, no corr.	Variation from Average.	P. c. of nitrite with corr.	Variation from Average.
0.2 cc. = .1764 gm.	27.4	742	26°	75.4	+0.78	72.5	+0.78
0.2 cc. = .1764 gm.	27.8	742	26°	76.4	−0.22	73.3	−0.02
0.2 cc. = .1764 gm.	27.4	740	24°	75.4	+0.78	72.8	+0.48
0.2 cc. = .1764 gm.	28.	740	24°	77.0	−0.82	74.2	−0.92
0.2 cc. = .1764 gm.	27.9	738	24°	76.7	−0.53	73.6	−0.32

On account of the difficulty of accurately introducing 0.2 cc. of the nitrite, the following modification was used: 2.0748 grams of the amyl nitrite were weighed in a graduated flask and enough alcohol added to make 100 cc. of solution. 10 cc. (=.20748 gms.) of this solution were used for each estimation. The following are the results of five assays:

Am't of nitrite used.	Cc. of gas.	Bar. Press.	Temp.	P. c. of nitrite without corr.	Variation from Average.	P. c. of nitrite with corr.	Variation from Average.
10 cc. = .20748 gm.	32.4	742	23°	74.7	+1.1	73.8	−0.08
10 cc. = .20748 gm.	32.8	739	22°	76.7	−0.9	74.5	−0.78
10 cc. = .20748 gm.	32.4	737	22.5°	75.7	+0.1	73.8	−0.08
10 cc. = .20748 gm.	32.6	736	26°	76.2	−0.4	73.25	+0.47
10 cc. = .20748 gm.	32.4	736	22°	75.7	+0.1	73.25	+0.47

The assay of the amyl nitrite affords a qualitative as well as a quantitative test of the nitrous radicle. Neither the U. S. P. nor the Ph. G. give a test for the amyl radicle. The following test is given by the P. Br.: "If it be added drop by drop to fused *potassium hydroxide*, potassium iso-valerianate will be formed."

New Remedies, Organic and Inorganic.

Alexine. A generic term for the socalled "protective albumins." Thus e. g. tuberculocidine = alexine TC. (Klebs.)

Alginoid Iron. A brown precipitate resulting from double decomposition between ferric chloride and sodium alginate, containing about 11 p. c. of iron. It is tasteless and non-astringent but possesses cathartic properties and may, therefore, be administered where other iron salts are not tolerated. Dose 0.15—1.0. It is soluble in ammonia, but is precipitated upon evaporation.

Alginoid Magnesium. A water soluble compound resulting from the action of alginic acid on magnesium carbonate, containing about 4 p. c. of magnesium. Its 40 p. c. aqueous solution possesses good adhesive properties.

Alginoid Mercuric Oxide. A grayish-white precipitate resulting upon double decomposition between mercuric nitrate (the chloride forms no ppt.) and sodium alginate. Its ammoniacal solution does not attack steel instruments, thus rendering it valuable for their sterilization.

Alginoid Mercurous Oxide. A gray precipitate resulting from double decomposition between mercurous nitrate and sodium alginate, containing 33 p. c. of mercury. It becomes black with ammonia water.

Alginoid Morphine. A water soluble salt containing 35 p. c. of morphine.

Alginoid Quecksilber oxid. Ger. for Alginoid mercuric oxide.

Alginoid Quecksilber oxydul. Ger. for Alginoid mercurous oxide.

Alginoid Strychnine. A salt containing 50 p. c. of alkaloid.

Alginoid Wismuth. Ger. for Alginoid bismuth.

Alizaringelb Marke C. Ger. } syn. for
Alizarin-Yellow C. Eng. } gallacetophenone.

Alkasal. Syn. for aluminum-potassium salicylate.

Allyl-mustard oil. Syn. for *Oleum sinapis volatile.*

p-Allyl phenylmethylaether. Ger. syn. for anethol.

Allyl senfoel. Ger. syn. for *Oleum sinapis volatile.*

Allyl sulfid. Syn. for.

Allyl sulphide $(C_3H_5)_2S$. Formerly supposed to constitute the bulk of oil of garlic. It is prepared artificially by heating allyl iodide and potassium sulphide in alcoholic solution. $2C_3H_5I + K_2S = (C_2H_5)_2S + 2KI$.

Prop.—It possesses a strong odor resembling garlic; m. p. 140°; sparingly soluble in water.

Use.—In ½ p. c. solution in sterilized olive oil it is injected subcutaneously as a remedy against phthisis and lupus.

As a 1/100 p. c. aqueous solution, warmed to 36° it is used for intestinal irrigation in cholera, three times daily.

Allyl sulfo carbamid(e). Ger. Eng.
Allyl sulpho carbamide. Eng.
Allyl sulfourea. Eng.
Allyl sulphourea. Eng.
Allyl thioharnstoff. Ger.
Allyl thiourea. Eng.
} syns. for thiosinamine.

Allylum sulfuratum. Lat. syn. for allyl sulphide.

Allyl tribromhydrin.
Allyl tribromid.
} Ger syn. for.

Allyl tribromide. $CH_2Br.CHBr.CH_2Br = C_3H_5Br_3$. Obtained by the action of bromine on allyliodide.

Prop.—A colorless or slightly yellowish liquid, which crystallizes in the cold; sp. gr. 2.436; b. p. 219°.

Use.—Recommended as a sedative and anodyne in asthma, whooping-cough and hysteria. Hypodermatically in doses of 2—3 drops in 1 ccm. of ether. Internally, 5 drops 2 to 3 times daily.

Allylum tribomatum. Lat. syn. for allyl tribromide.

Aloïn formal. $CH_2:C_{17}H_{16}O_7 = C_{18}H_{18}O_7$.

Prep.—By heating a solution of 1 p. aloin in 2 p. of water with 1 p. of a 40 p. c. formaldehyde solution and 1 p. of conc. sulphuric acid.

Prop.—A yellow, amorphous, tasteless powder, insoluble in water, difficultly soluble in alcohol.

Use.—As a substitute for aloin.

Alpha-Creosote. An artificial creosote mixture containing 25 p. c. guaiacol.

Alpha-Eigon. An iodine compound of albumin with constant iodine content. Comp. Eigone. Used as antiseptic in the treatment of wounds.

Alpha-Eigon-Natrium. Sodium derivative of alpha eigon. A substitute for potassium iodide in doses of 0.6 to 2.0 three times daily. Comp. Eigons.

Alpha-Eucaine. See Eucaine-A.

Alpha-Guaiacol. Crystalline, synthetic guaiacol, socalled in order to distinguish it from other commercial guaiacol.

Alpha-Guajacol. Ger. for Alpha-guaiacol.

Alpha-Kreosot. Ger. for Alpha creosote.

Alpha-Toluic Acid. Syn. for phenylacetic Acid.

Alpha-naphthol orange. Syn. for Tropaeolin 000 No. I.

Alpha-naphthol salol. Syn. for Alphol.

Alpha-naphthol salicylsaeure ester. Ger. syn. for Alphol.

Alphol. *Syn.* — α-Naphthol solicylat(e), Alpha-naphthol salicylsäure ester. α-Naphthalol salol, Salicyl-α-Naphthyl ester. Comp. Betol and Salol.

Form. — $C_{10}H_7.O.CO.C6H_4.OH=C_{17}H_{12}O_3$. The salicylic ester of α-naphthol, $C_{10}H_7OH$.

Prep.—Comp. Betol.

Prop.—A white powder, readily soluble in alcohol, ether and fatty oils, difficultly soluble in water.

Use.—Antiseptic and antineuralgic, closely related therapeutically to betol and salol. Dose 0.5 to 1.0 to 2.0, two to three times daily in wafers.

Alsol. Syn. for Aluminium acetotartrate.

Alstonine. An alkaloid from the bark of *Alstonia constricta*, Fam. *Apocynaceae.*

Prop.—Colorless needles of silver lustre which are readily soluble in alcohol, ether and chloroform. They are insoluble in cold water, but impart a bitter taste to hot water.

Use.—It has been recommended as stimulant in typhoid.

Aluminum.—β-naphthol disulphonat(e). Germ. & Eng. }
—— β-naphtholodisulfonicum. Lat. } syns. for aluminol.
—— naphtholo sulfuricum. Lat. }

Aluminium acetico-tartaricum. Lat. syn. for.

Aluminium aceto-tartrate. *Syn.*—Alsol, Aluminium acetico-tartaricum. Essig-weinsaure Thonerde.

Prep.—A conc. aqueous solution of 5 p. of basic aluminium acetate and 3 p. of tartaric acid is precipitated with alcohol. It contains about 25 p. c. of aluminium calculated as oxide.

Prop.—White, glossy, gum-like fragments possessing an acid, astringent taste, soluble in an equal part of water.

Use.—It is recommended as a substitute for *Liquor aluminii acetici:* in 1—2 p. c. solution in the treatment of wounds.

Aluminium ammonium salicylate. Syn. for Salumin, soluble.

Aluminium, basic-gallate. Eng. } syns for gallol.
Aluminium, basisch-gallusaures. Ger. }

Aluminium, basic-tannate. Eng. } syn. for Tannal,
Alluminium, basisch-gerbsaures. Ger. } in soluble.

Aluminum caseinicum. A. caseïnat (Meyer) Ger.

Prep.— By the addition of *Liquor aluminii subacetici* to sterilized milk previously freed from albumin, washing and drying the precipitate and removal of the fat with ether.

Prop.—A yellowish-white, tasteless powder, insoluble in water, sp. gr. 1.3, containing 5 p. c. of aluminium.

Use.—As astringent in intestinal catarrh. Dose for adults 0.23 to 0.30, for children beginning with 0.03 hourly.

Mallinckrodt's CHEMICALS.

Pharmacists who handle the well known "M. C. W." brand are in a position to satisfy the most critical demands of physicians. The "M. C. W." brand costs no more than any other, and may be had from every wholesale drug house in the United States.

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 473 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street **111 Fifth Avenue**
PHILADELPHIA **NEW YORK**

LIVERPOOL, England. To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. PRICE, 77 Lord Street, Liverpool, England.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

EXTRACT OF BEEF
MADE ACCORDING TO PROCESS OF
PROF. JUSTUS VON LIEBIG
FROM FRESH BEEF OF PRIME QUALITY
GUARANTEED PURE
Add a little salt, or celery salt
MANUFACTURED BY URUGUAY BEEF CO. GENERAL OFFICES HAMBURG, GERMANY
SOLE AGENTS FOR THE UNITED STATES OF AMERICA LEHN & FINK NEW YORK
MADE IN URUGUAY

Uruguay Beef Extract

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or domestic. Besides possessing all the stimulating and nutritive properties of a high grade Beef Extract, it is sold at a price which allows dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.
Sole Importers.

FORMIN. Hexamethylene-tetramine Merck. Presents this ide urinary antiseptic in its highest obtainable purity. In powder form, *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectan Used the world over. Beware of imitations, which are poisonous and the same time possess less disinfectant power. See that the signatu of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable th the real virtues of cod-liver oil reside in an active principle or principle Gaduol is the alcoholic extract of the active principles of cod-liver oi It produces a stimulant and alterative effect on the processes of nutritio and absorption, and does not disturb the appetite or affect the stomach A wine of cod-liver oil prepared from Gaduol is a favorite tonic and ha a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of man babies. It should be free from all impurity and adulteration. MIL SUGAR MERCK is of the highest purity and fineness. Specify: MERCK

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY

DR. FREDERICK HOFFMANN.

EDITED BY

DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M.D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 8.

AUGUST, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial.. 277
Drugs of Primitive Peoples.. 279
$\Delta^{1\cdot 4}$ Terpadiene-3-oxime-6-one ("Nitroso Carvacrol.") By *E. Kremers* and *I. W. Brandel*.. 290
Phytochemical Notes. From the laboratory of *Edward Kremers*.. 293
Drugs used by North American Indians........ 300
Books reviewed.. 306

Our largest private formula accounts were small once; the smallest today may be large two years hence. So we give each patron all the benefit of our immense modern plant and 50 years' experience. It pays.

Let us figure on your formula.

FREDERICK STEARNS & CO.
DETROIT, MICH.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,

913-917 Cherry St.,
PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,

DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award.

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

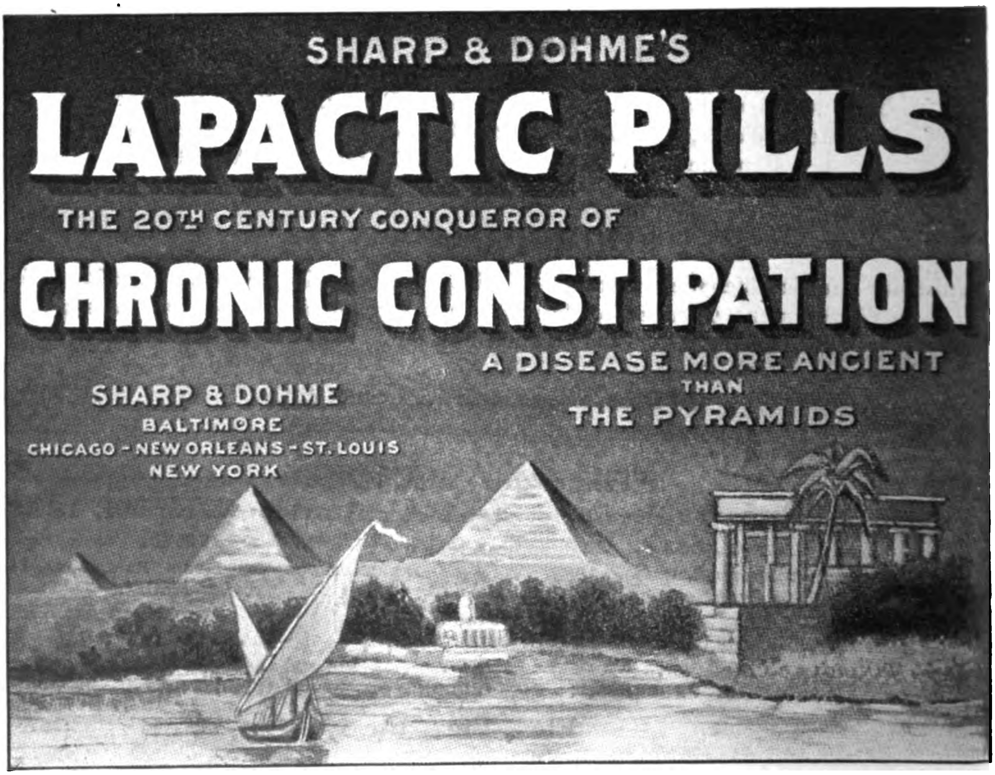
(Compound of stear-amide with hydrocarbons.)

Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 15% water.

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.


SHARP & DOHME'S
LAPACTIC PILLS
THE 20TH CENTURY CONQUEROR OF
CHRONIC CONSTIPATION
A DISEASE MORE ANCIENT THAN THE PYRAMIDS
SHARP & DOHME
BALTIMORE
CHICAGO - NEW ORLEANS - ST. LOUIS
NEW YORK

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

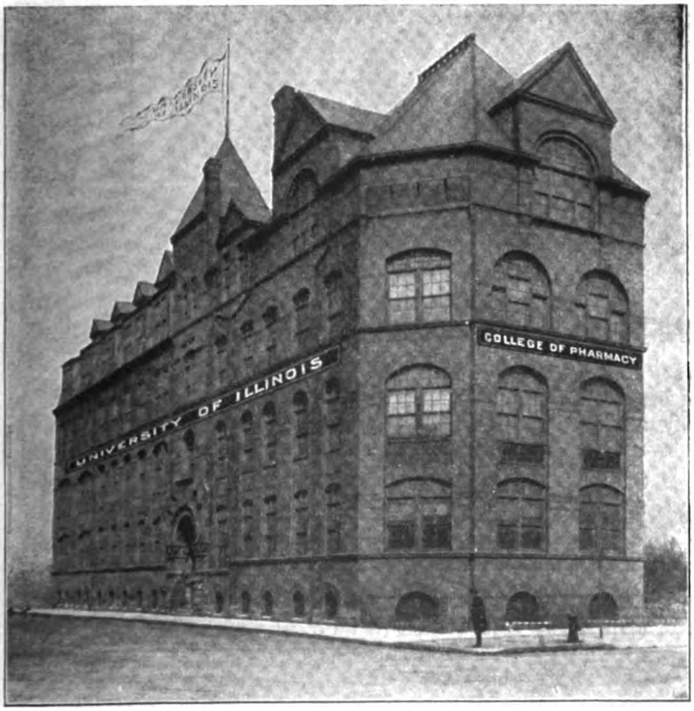
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK



University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

ADRENALIN CHLORIDE
SOLUTION
ADRENALIN CHLORIDE
1:1000
A solution of the blood pressure raising principle of Suprarenal Gland.
Adrenalin chloride, - 1 part
Normal sodium chloride solution (with 0.5% Chloretone). 1000 parts
PARKE, DAVIS & CO.
DETROIT, MICH. U.S.A.
HAY FEVER

"WITHOUT A PEER!"

Medical men say this of *SOLUTION ADRENALIN CHLORIDE* in the treatment of Hav Fever. This marvelous astringent and vasomotor stimulant will be widely used during August and September. We are advertising it liberally in every prominent medical journal in America.

PER OUNCE VIAL, NET, 85 CENTS.

NOTE.—We also supply ADRENALIN INHALANT, a neutral oil solution containing 1-1000 Adrenalin Chloride (in ounce vials), and ADRENALIN OINTMENT, 1000 parts of a neutral base and 1 part Adrenalin Chloride (in collapsible tubes), both admirable agents in Hay Fever.

PARKE, DAVIS & COMPANY.

HOME OFFICES AND LABORATORIES, DETROIT, MICH.

Pharmaceutical Review.

Volume 22. AUGUST, 1904. Number 8.

For several years past the **American Pharmaceutical Association** has been repeatedly invited to hold its annual meeting in one of the southwestern states. As a result of these invitations and because of the Louisiana Purchase Exposition at St. Louis, Kansas City, visited in 1881, is to be revisited during the second week in September. In as much as Kansas City is but a night's ride out of St. Louis, the exposition is supposed to bring increased attendance upon this meeting rather than to detract from it. This much is certain that more than usual efforts are being made in an unusual manner, not only to secure a large attendance, but also to increase the membership of the Association.

With the A. Ph. A., there will convene at Kansas City the American Conference of Pharmaceutical Faculties. The organization of this conference having been perfected, it may now be expected to do something more toward the advancement of pharmaceutical education in this country than merely to bring a number of college men together once a year. Already the fundamental question of enterance examination has been brought up by means of a circular letter from one of our westernmost colleges of pharmacy. A year ago a proposition to regulate the requirements for admission on ever so low a basis would have been side tracked or, if persisted in, might have broken up the organization. To-day it may expect to receive careful consideration, largely because of the changes that have taken place in one of the oldest eastern colleges.

While at Mackinac the A. Ph. A., as represented in its Section on Education and Legislation, appeared to have delegated educational subjects almost altogether to the allied Conference, steps were taken by the Association to secure a similar conference of representatives of the state boards of pharmacy.

It is to be hoped that this conference will be largely attended and that a permanent and strong organization for good will be effected. With such a conference well established we may look for a joint session of both conferences in the near future. United action by both conferences will be necessary before a reasonable advance along the entire line may be expected.

While the A. Ph. A. reveals its vitality and adaptility to circumstances by grouping about itself organizations that may hope to cope in a positive manner with problems where it may but suggest and advise, we should not lose sight of the parent association itself.

The questions of finance and membership will have to come up for something like definite action. While the Association is by no means in an alarming condition, it has not grown in strength numerically as it ought to have with our increased population. If a national association must constantly call attention to the value of its *quid pro quo*, there appears to be something wrong either with the Association or with the American pharmacists who ought to flock willingly to its support.

The manner in which our officers are being elected has caused much comment of late and it has been suggested by some that the A. Ph. A. follow the example of the A. M. A. by debarring every one who seeks an office. Something will have to be done soon if ward politics are not to acquire the overhand and disgust many of our best members to the extent that they will stay away from the meetings.

It would be a questionable gain indeed if we were to secure a hundred new members because of a commission fee of twenty per cent. and loose ten good members of long standing because of the dominance of office seekers.

The rumor of the proposed formation of a Canadian Pharmaceutical Association ought to bring to the front another problem. It is impossible for an organization like the A. Ph. A. to keep in touch with its constituency in the different parts of the United States, much less of the North American continent, by means of an annual volume of proceedings and an annual meeting here and there. The American Chemical Association has solved the problem by means of its journal and sections with frequent sectional meetings. The A. M. A. has recently adopted a similar method only more far reaching in its details.

These are some of the problems that will have to come up at Kansas City, to say nothing about the programmes of sections most of which are as interesting as they have been crowded in late years. Certainly the programme is of sufficient import to cause every pharmacist who takes an interest in his profession to come to Kansas City if he possibly can. The hour calls not only for new members with their new ideas and enthusiasm, but especially for attendance of the older members with their association knowledge that comes from long experience as active members.

Drugs of Primitive Peoples.*

2. The Collection of Drugs.

"As already stated, we do not intend here to repeat the lists of drugs and medicaments used by the peoples still in a state of nature. It is not without interest, however, to learn how the various tribes or rather their medicine men procure their medicaments, how are prepared and how preserved.

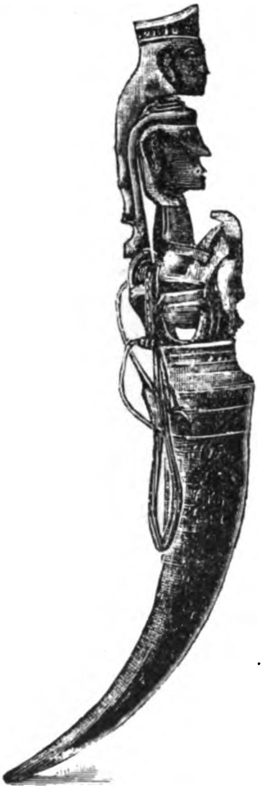


Fig. 5.

Purminakum, a goat horn with medicine. The cover consists of a human figure called Ganagana, riding on another. From the Battah in Sumatra. In the Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

---

* Continued from p. 247.

"In the collection of the crude materials certain prescribed rules must be carefully observed. Thus, in the province of Kroë in East Sumatra the collection of the crude materials and the preparation of the medicaments must be done on specified days. Certain prayers and formulas must be recited which are later repeated in the treatment of the patient. In Tanembar[80] and in the Timorlao[81] islands large crowds take part in the collection. All who collect and even those who accompany them must repeat the following prayer: '*O Dudilaa*, let me see that these leaves, when drunk, are good.'

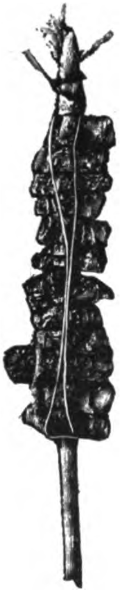


Fig. 6.

Chuletú, a stick with twelve pieces of calamus root. These are dispensed by the medicine-men of the "Golden" for the preparation of an infusion for lying-in women. Collected by Adrian Jacobsen. In the Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

"In the Seranglao- and Gorong Archipelago[6] the extract of the leaves of *Nipa fonticans* is used as a remedy against erysipelas. Before the leaves are picked, a silver ring is buried under the tree and the following formula is recited: 'We greet you, prophet *Logman*, the wise one. Here I deposit the ring and take your remedy.'

After the leaves have been picked the ring is again unearthed and taken away.

"Attention may here be called to the ancient prescribed rules of Indian medicine observed in the preparation of mercury for medicinal purposes, when the following prayer is recited: 'Ugra, I greet thee, o Ugra, I offer thee my homage. Goraksha, Ishwara, Sarva, Schiva and Badra, I greet your several forms and pray for your asstistance in order that this medicine may become effective.'

"In Keisar[32] a thank offering is rendered to the tree from which the drug has been obtained after the patient has been cured. On the Loango[33] coast nocturnal conjurations are required in order to procure the medicaments. During these performances the fetishes, who have been called by their secret names, appear in the form of dogs, goats etc. to the *ganga* and indicate to him where the necessary medicaments can be found.

"The *raoen* herbs which are used in Koetei, Borneo, as drugs are exposed to dew at night in order to increase their medicinal activity. In Cambodja[34] they also believe in the effectiveness of the nocturnal dew. During the cool nights of the dry reason white cotton cloth is spread out over the grass in the evening. In the morning it is expressed in the *phtel,* a metal dish possessed by every family. With this dew-water the liquid resin of the tree *thbeng* is mixed and yields a refreshing beverage against internal heat."

3. The Preparation of Medicaments.

"Among the North American Indians the drug is not supposed to be active by virtue of itself, but the medicinal action is imparted to it by the witchcraft of the medicine-man. All natural products which he intends to use for his medical practice are first boiled in a mysterious manner, stirred, shaken and filtered while these operations are accompanied by the noise of the rattle, humming, murmuring, singing and conjurations. It is only in this manner that they are supposed to acquire the proper medicinal activity.

"Jacobsen[35] relates of the Indians of the Copper river[36]: 'In the making of charms, the medicine men proceed in the following manner: 'First he puts on his festive garb which consists of an apron decorated with bills of birds or the claws of the wild mountain goat. He paints his face and covers his head with a kind of hat, or, according to the kind of medicine he desires to prepare, covers both with a mask.

He also takes a rattle in his hand. In the center of his dwelling a large fire is lit about which he dances in the presence of the natives who rush in.'

According to Bastian,[37] the Siamese, when they prepare a medicine, fasten strips of paper, upon which mystic words have been written, on the rim of the dish. The object of this is to prevent the *Pet-Phaya-Thong*, certain evil air spirits, to withdraw the power of the medicament during the evaporation.

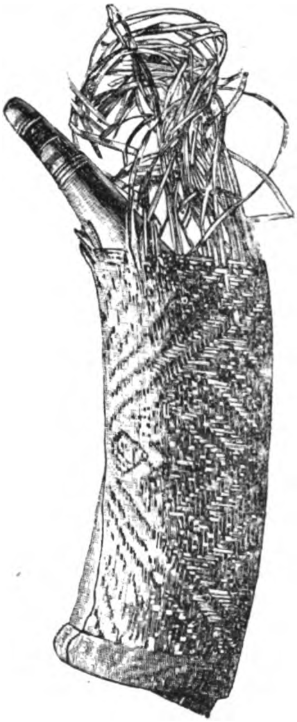


Fig. 7.

Dasän tandok hadangan, a buffalo horn enclosed in a mat, from the *Kwâla Kapuas* in Borneo. Those who are possessed by the *Saugiang* or air spirits must drink out of it. In the Museum für Völkerkunde in Berlin. According to a photograph by Bartels.

"Among the Ganguella negroes[23] also, who were visited by Serpa Pinto,[38] the medicine-man must perform a number of ceremonies and recite certain incantations while mixing and preparing his medicines. Without these the medicine would not be active.

"A similar account is given by Holub[29] of the Beschuani[30]: 'The collected parts of the plants are then dried, roasted and pulverized, and an infusion of the powder is given as remedy. The preparation and administration, however, are accompanied by the observance of certain formalities and the recital of maxims.'

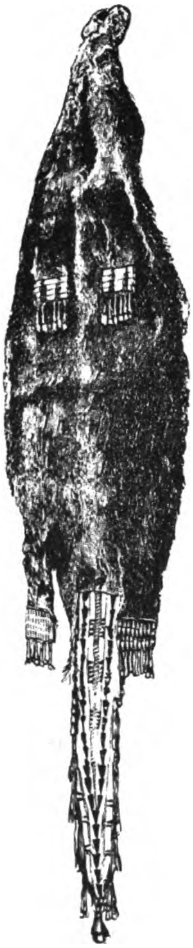


Fig. 8.

Medicine-bag of Missouri Indians. The pelt of an otter decorated with the quills of a porcupine. Museum für Völkerkunde, Berlin. According to a photograph by Bartels.

"In certain instances special assistance is needed. Thus e. g. the physician of the Minangka[40] farmers in Sumatra must, in the case of sickness, provide seven different substances. However, he dare not prepare them himself. This must be done by a clean woman, i. e. one who at the time is not effected by menstruation. A certain famous popular remedy which is not wanting in any home of the Seranglao and Gorong archipelago,[6] must be prepared by special persons. It is a blessed oil which serves as antidote against poisoning. It is prepared from a young, red kalapa, upon which the sun has been shining in the morning. It must be picked on a Friday by a boy who has not had sexual intercourse. The oil is then prepared by a girl who is clean and who has bathed previously. Finally it is blessed by a priest."

4. The Preservation of Medicaments.

It is the custom of the medicine-men of the North American Indians carefully to dry their drugs and then to pulverize them in a mortar. Thus prepared they can no longer be identified by others. They are preserved in bags made of skins or in bladders, which are impermeable to air and in part to water. Those made of the racoon, the otter (Fig. 8) and the skunk are supposed to impart special virtues to the drugs which they contain.

"The medicine bag is made from the pelt of the entire animal, the hair being on the outside, and is frequently decorated with pearls, and the quills of the porcupine. To the pulverized drugs other substances are frequently added in order to cover taste and odor and thus to render them impossible of identification by the uninnitiated.

The medicine bag is subject to a peculiar charm. Even the medicine-man does not open it without having previously subjected himself to the ceremony of a vapor bath.

"The *Ganga* of the Loango[38] negroes also carry a medicine bag. It is covered with a red cloth, small bells are fastened to it and it contains stones, shells, nuts, fragments of horns, snake teeth etc. Particles scraped from these are regarded as powerful medicaments.

"Among the Australasian negros of Victoria the medicine-men likewise carry their medicine stones and magic bones from the emu[41] in a bag called *Belang*. They must not allow it to pass out of sight for as long as they take good care of it sickness can not overtake them. At times, however, his *Len-ba-moorr*, i. e. his supernatural protector, becomes dissatisfied with the medicine-man. He then transfers his medical treasures to the bag of another medicine-man. With these his powers have left him. He takes sick and in a short time dies.

"The Museum für Völkerkunde at Berlin has among its collections several vessels for the storage of medicaments. One of them is a plain wooden jar from Bonerate, another is carved. Fig. 1.*

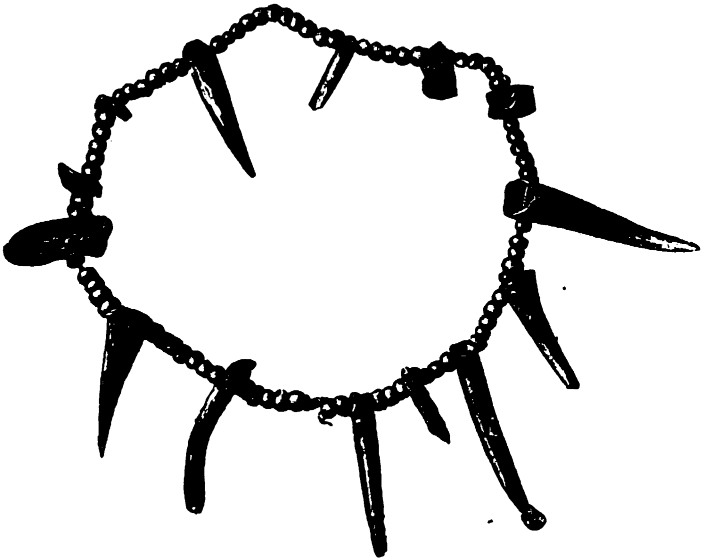


Fig. 9.

Necklace of beads of the Zulus in Natal, with drugs and the tips of antilope horns containing medicaments. In the private collection of the author, and according to a photograph by him.

"From the mouth of the Kapuas river in Borneo there is a horn enclosed in pretty, polychrome wicker-work. (Fig. 7.) From it those who are possessed by the *Sangiang* or air spirits drink arrack. From the Battas of Sumatra there are two goat horns (Figs. 2* and 5), with carved covers, which are filled with medicaments. The carving represents a human form riding on another. A small vase, which contains a medicine said to possess great powers of witchcraft and which, according to report is prepared from human flesh, also comes from the Battas (Fig. 11). It is likewise closed with a cover supporting a rider on horseback. This statuette is to represent the *Pangulu balang*, the spirit of medicine.

---

* See the previous number of this journal.

"A very queer method to preserve medicaments is found among the Zulus of Natal. I am indebted to Mr. Prozesky, a missionary, for a necklace (Fig. 9) which is made of beads as large as peas and of an opaque-yellow color. In irregular intervals all sorts of objects are fastened between the beads: a part of the bill of a duck, pieces of wood and roots, more particularly, however, the ends of horns of the antilope. These horns are used for the storage of drugs, each horn being used for a special medicament good for a particular disease. The root fragments etc., however, are also important medicaments and are used for certain ailments.

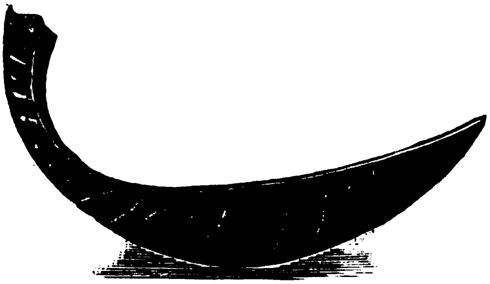


Fig. 10.

Medicine-spoon of the Singhalese, prepared from the shell of a nautilus. Museum für Völkerkunde in Berlin. According to a photograph by Bartels.

"The Shamani of the "Golden" in Siberia direct a potion to be prepared from the roots of calamus for women in childbed. The necessary drug, twelve pieces of root pierced by a small stick, are thus handed to the husband of the patient. (Fig. 6.)

"The Singhalese use special spoons for the administration of medicine. Some of them are sections of nautilus shells (Fig. 10) others are hard burned earthen ware, either round or elongated heart-shaped. (Fig. 3.)

5. The Cultivation of Medicinal Plants.

"Commonly the drugs used for medicinal purposes are taken from the plant life of field and forest which surround primitive people. Their economic plants, e. g. rice, banana, cocoanut, pepper etc. are also used in like manner. However, there are instances, though isolated, where certain plants are cultivated especially for medicinal purposes. Such is the case with the Annamites and in Sumatra.

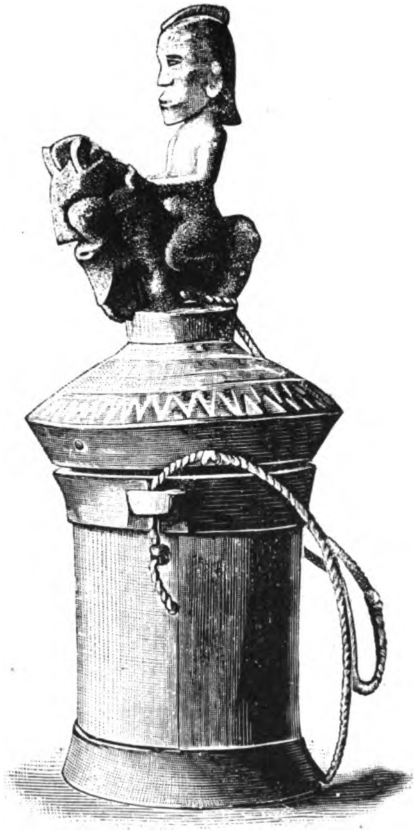


Fig. 11.

Perminacan, a vase with a medicine, said to be prepared from human flesh, which is believed to possess great powers of witchcraft. The rider statuette on the cover represents *Pangulu balang*, the spirit of medicine. From the Battas of Sumatra. Museum für Völkerkunde in Berlin. According to a photograph by Bartels.

"The inhabitants of Central Sumatra use the milky juice of a cactus, known as *Soedol soedol*, boiled with palm oil and drop the

preparation into the ears of children affected with certain diseases of this organ. This cactus is specially cultivated by them for this very purpose.

"The Annamitic sorcerer-physicians make extensive use of a bulbiferous plant to which are ascribed special magic virtues. This plant, known by the name Ngâi, grows wild in the mountains, but is also cultivated by him secretly in his house or in the fields. In certain intervals he must sacrifice a white cock to his guardian spirit at the place where he cultivates these plants. Repeating certain incantations, he deposits the cock with tied feed. The next morning nothing is left of the animal but its feathers."

6. The Administration of the Medicaments.

"In order that the proper power may be imparted to the medicaments, it may be necessary to recite certain prayers while the drugs are being collected and to murmur certain incantations while the medicaments are being prepared, while with the administration of the medicine such usage may be repeated. In Keisar e. g. prayer is offered to *Mahkarom manouwe* before the medicine is taken in order that he may cause a favorable result. In the Seranglao and Gorong archipelago the following words are spoken when curcuma juice is administered as a laxative to a child: 'In the name of the good God. I believe in God, his angles, his ambassadors, his books, in predistination, and that all good as well as all bad things come from God.'

"According to Schoolcraft, there exist among the North American Indians a class of medicine-men, who after they have prepared themselves to administer to the patient, address the medicine entreating it to cleanse the sick person.*

"Attention remains to be called to one of the most peculiar customs according to which the medicine-man himself takes a part of the medicine prepared for his patient. This was observed by W. Matthews* in connection with a great medicinal ceremony of the Navajo Indians, the socalled mountain chant. In one of the acts of this performance, the medicine-man sprinkled part of an infusion on the head, breast and eye-brows of the deities painted in a peculiar manner. Twice he gave the patient to drink, her companion had to take of it as often and he did the same. The onlookers received what remained. They carefully dried the vessel in order that not a drop might be lost."

---

* See article on "Drugs used by Indians" in this number.

---

[30] Tanembar or Tenimber islands, in the eastern part of the Malay arch., northwest of Timorlao.

[31] Timorlao or Timorla'ut islands, in the eastern part of the Malay arch., between Timor and New Guinea.

[32] Keisar or Kisser, one of the small Sunda islands, north of Timor.

[33] Loango, in West Africa.

[34] Cambodja or Combodia, a French dependency in Indo-China.

[35] A. Woldt: — Capitän Jacobsen's Reise nach der Nordwestküste Amerikas. Leipzig, 1884.

[36] Copper river, in Alaska.

[37] A. Bastian: — Die Völker des östlichen Asiens, Studien und Reisen. Dritter Band. Reisen in Siam im Jahre 1868. Jena, 1867.

[38] H. v. Wobeser: — Serpa Pinto's Wanderung quer durch Afrika vom Atlantischen zum Indischen Ocean durch bisher grösstentheils gänzlich unbekannte Länder etc., nach des Reisenden eigenen Schilderungen frei übersetzt. Leipzig, 1881.

[39] Inhabitants of Bechuanaland in S. E. Africa.

[40] Minanga or Minangka, a tribe in Sumatra.

[41] A large Australian bird resembling the ostrich.

[42] The Mountain Chant: a Navajo ceremony. Fifth annual report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1883—84. Washington, 1887, pp. 379—467.

$\Delta^{1.4}$ Terpadiene-3-oxime-6-one.*

("Nitroso Carvacrol".)

By *E. Kremers* and *I. W. Brandel.*

Chemical Properties.

Displacement of Hydrogen by a metal.

The nitrosocarvacrol is dissolved in an aqueous solution of potassium hydroxide, in which it is readily soluble with a deep red color. This solution is neutralized with nitric acid and the solution filtered. The silver salt is precipitated with silver nitrate. The precipitate is filtered off, washed thoroughly with distilled water and dried first on a porous plate and finally in a desiccator. When first precipitated, the compound is brown in color, but upon exposure to the light it becomes dark green. Upon washing the precipitate on the filter with cold distilled water, a considerable amount of it went into solution, but upon standing over night, it again separated out from the aqueous solution. It appeared slightly crystalline.

The amount of silver is determined by burning. In two successive determinations, the amount of silver was found to be 36.84 percent and 36.66 percent respectively which corresponds to one atom of silver per molecule. Upon making a silver determination in the same way, of the silver salt which separated out from the aqueous filtrate, 54 percent, corresponding to two atoms of silver per molecule, were found. We thus have a silver salt of nitrosocarvacrol having the formula $C_{10}H_{12}NOAg$ and also one having the formula $C_{10}H_{11}NOAg_2$.

Two successive determinations of the corresponding silver salt of nitrosothymol[30] gave 54.36 and 54.1 percent of silver which corresponds to two atoms of silver per molecule.

Phenyl Hydrazine.

Plancher[31] in 1896 studied the effect of phenyl hydrazine upon nitrosophenols generally and he included nitrosocarvacrol in his observations. If phenylhydrazine is allowed to act upon nitrosophenols in a benzol solution, there immediately takes place a reduction of the nitrosophenol to amidophenol. The appearance of phenylhydrazone-quinone, which might be an intermediate product, can only be be isolated in a few cases. Plancher, therefore, concluded that no hydrazone is formed of the amidophenols obtained. Amidothymol and amidocarvacrol are identified by means of the preparation of some of their derivatives.

---

* Continued from page 255.

[30] This had been treated with hot water.

[31] Gazz. Chim. 25 (2), p. 379; Ber. 29, R., p. 294.

Oxidation of NO to NO_2 Group.

In an alkaline solution, nitrosocarvacrol can be oxidized with potassium ferricyanide to "nitrocamphothymol" or binotrocarvacrol $C_{10}H_{12}\left\{\begin{matrix}OH\\NO_2\end{matrix}\right.$. This is obtained in the form of yellow needles, barely soluble in water and melting at 77—80°. This nitro compound is reduced with zinc chloride, the solution filtered from the zinc sulphate and evaporated when the amidocamphothymolhydrochloride, $C_{10}H_{12}\left\{\begin{matrix}OH\\NH_2HCl\end{matrix}\right.$ can be obtained in red needles, which are very soluble in alcohol and water and decompose without melting near 259°.[32]

Reduction of NO to NH_2 Group. (Amido Carvacrol.)

Wallach and Neumann[33] obtained amidocarvacrol by the reduction of the nitrosocarvacrol, with tin and hydrochloric acid. This forms a difficultly soluble double tin salt of amidocarvacrol which is separated from the tin by the precipitation of the tin sulphide with hydrogen sulphide. The amidocarvacrol hydrochloride separates out in thick prisms from the evaporated solution. This melts at 214—215°. The free amidocarvacrol is separated by the cautious neutralization of the amidocarvacrol hydrochloride solution with ammonia.

In the laboratory, amidocarvacrol was prepared by dissolving nitrosocarvacrol in ammonia water and then reducing it with hydrogen sulphide. The ammoniacal solution of nitrosocarvacrol was deep red in color but upon reduction it became almost colorless. The amidocarvacrol separated out in white or pinkish laminae which melted at 135.5°. The base oxidizes very readily in a moist condition. It should therefore be immediately filtered and dried in a desiccator. By crystallizing from hot alcohol, it is obtained as colorless crystals which melt at 134°. Mazzara[34] gives the melting point as 304°.

The most characteristic derivative[35] of amidocarvacrol is the triacetylamidocarvacrol, $C_{10}H_{12}\left\{\begin{matrix}N(CHO)_2\\O.C_2H_3O\end{matrix}\right.$. The hydrochloride of the amido compound is heated with powdered fused sodium acetate and acetic acid anhydride for a long time with a reflux condenser and the product poured into water after cooling. An oil separates out which becomes hard after washing with soda. The product, crystallized from petroleum ether melts at 75.5°.

---

[32] Ber. 12, p. 883.
[33] Ber. 28, p. 1661.
[34] Ber. 12, p. 888.
[35] Ber. 28, p. 1661.

The monoacetyl amidocarvacrol[36] $C_{10}H_{12}\left\{\begin{array}{l}NHC_2H_3O\\OH\end{array}\right.$ can be obtained from the triacetylamidocarvacrol by heating it with exactly two molecules of sodium hydroxide in an aqueous solution for twenty minutes. It separates as a crystalline body which is recrystallized from diluted alcohol and melts at 176—177°. The monoacetylamido carvacrol can also be prepared from amidocarvacrol by pouring acetic acid anhydride into a benzol solution of it[37] the product obtained in this way also melts at 176—177°.

The methyl ether[38] $C_{10}H_{12}\left\{\begin{array}{l}NH.C_2H_3O\\OCH_3\end{array}\right.$ is obtained in fine needles which are soluble in alcohol and water and melt at 140°. By heating the monoacetyl compound, the acetyl group is lost and the hydrochloride of the amidocarvacrolmethylether ($C_{10}H_{12}NH.OCH_3.HCl$) is obtained. It melts at 229°. From its aqueous solution the difficultly soluble sulphate can be precipitated by the addition of sulphuric acid. These salts are readily oxydized and give with ferric chloride in solution a beautiful blue color. By heating it with sodium acetate and acetic acid anhydride, one can easily obtain from the salt the biacetylamidoether, $C_{10}H_{12}\left\{\begin{array}{l}N(C_2H_3O)_2\\OCH_3\end{array}\right.$ in the form of fine needles which melt at 104°.

Amidocarvacrol[39] can be readily diazotized to hydrothymoquinone and subsequently oxidized to thymoquinone. The amidocarvacrol is dissolved in water which is slightly acidulated with sulphuric acid. Sodium nitrite is added forming nitrous acid, which acts upon the amidocarvacrol. One molecule of sodium nitrite was taken for every molecule of amidocarvacrol. Steam was passed into the liquid, and it was distilled. The thymoquinone passed over and was collected. Thymoquinone occurs as yellow prismatic crystals which melt at 45° It is difficultly soluble in water, easily soluble in cold alcohol or ether; soluble in cold sulphuric acid and cold fuming nitric acid. When an excess of sodium nitrite is avoided, the hydrothymoquinone is formed remaining in the solution in the flask after distillation, from which it crystallizes out upon cooling. It is crystalline and melts at 140°. It is very difficultly soluble in cold water, moderately soluble in hot water and easily soluble in alcohol and ether.

---

[36] Ber. 28, p. 1662.
[37] Ber. 29, p. 294.
[38] Ber. 28, p. 1662.
[39] Ber. 26, p. 1661.

Phytochemical Notes.

From the Laboratory of *Edward Kremers.*

56. Oregon Balsam.

By *Frank Rabak.*

The literature on Oregon balsam is very meagre and the few statements that can be found are conflicting and far from satisfactory. The object of this account is not to settle once for all the several contradictions, but to use it as a basis for a more satisfactory study when opportunity offers.

One of the earliest statements concerning Oregon balsam, found upon a casual review of pharmaceutical literature, is in the report of the Committee on the Drug Market of the American Pharmaceutical Association for 1873:* "Canada balsam has been very scarce and high, opening in June with about $4.00 per gallon, advancing until April, when it reached $6.00, and early in June $7.00, receeding about July 1st to $5.75. Oregon balsam has sold at $3.50 to $4.00, but does not meet with a ready demand."

In the following year, the Report on the Progress of Pharmacy† contains the following information under "*Oregon balsam of Fir.*—"Under this name an oleo-resin has appeared in commerce, which Prof. J. M. Maisch thinks is rather suspicious in appearance. It comes from New York, has not been traced further, is thick, liquid, bright brownish in color, terebinthinate, and aromatic in odor. On rubbing a little of it between the fingers, different odors become quite evident, the last one remaining being that of nutmegs. It has the appearance of being merely a solution of common resin of turpentine, flavored perhaps with a little of the oil of *Eucalyptus globulus*, and a somewhat larger quantity of oil of nutmegs."

The prime "Oregon balsam" is not found in recent editions of either the U. S. and American dispensatories. The index of the National Dispensatory refers the reader to the following item: "Common turpentine is not liable to adulteration, but a fictitious Canada turpentine has occasionally been sold under the name of *Oregon*

---

* Proc. A. Ph. A., 21, p. 483.

† Proc, A. Ph. A., 22, p. 164; from Am. Journ. Ph. ——, p. 106.

balsam of fir, which was made by dissolving rosin in oil of turpentine and flavoring the solution by the addition of a little oil of wormwood. A liquid pale-yellow turpentine may be procured by puncturing the vesicle of the bark of *Abies* (*Pinus*, Douglas) *Menziezii*, Lindley,[*] the *balsam pine* of the Pacific coast. The sample in our possession slowly deposited white granular matter, and became rather opaque and solid."

Proceeding to recent journal literature on the subject we find an article on "Canada and Oregon Balsam"[‡] by E. Dowzard in the March 12. number of the "Chemist and Druggist." The article is introduced by a rather queer statement concerning Canada balsam. As to Oregon balsam, we are informed that it "appears to be made by dissolving colophony in turpentine, and as it is being used as an adulterant of Canada balsam, a sample was obtained and an examination made to find if there are any analytical data by which it can be distinguished from and detected in 'Canada balsam.' The balance of the short paper is devoted a discussion of the physical and chemical constants of the two products for comparison.

This article called forth a rejoinder from a New York correspondent[§] of the journal in which he quotes Mr. E. Dowzard as stating "that this balsam is generally understood to be a mixture of turpentine and resin. This is by no means the case.

"It is doubtless true that with Oregon balsam selling at $1.15 to $1.25 per gal. sophisticated balsam is manufactured, but with Oregon balsam at its normal figure of 55c. in this market there is no incentive to manufacture sophistications. If Mr. Dowzard had seen the balsam which came to this market last fall direct from Oregon, he would have hardly made so sweeping a statement as to its origin. The unusual wet weather was responsible for the balsam arriving in a most deplorable condition, totally unfit for sale until it had been clarified and freed from water, pieces of bark, and dirt. The freight from Oregon to New York will cost about 20c. per gal., so that the collector can not get normally over 35c. for his balsam, out of which he also has to furnish packages and cartage. Can Mr. Dowzard manufacture Oregon balsam for 35c. per gal.?"

---

[*] See letter from Mr. Sudworth below.

[†] The same statement concerning *A. Menziezii* is found in the latest edition of the Am. Disp., p. 1923.

[‡] C. & D,, 64, p. 439.

[§] Ibidem, p 757.

In connection with his instructional work in plant chemistry, the writer has been in the habit of using Canada balsam as a convenient illustration for the separation of an oleoresin into a volatile oil and a resin by his students. Two years ago, it occured to him that Oregon balsam might be substituted to advantage in order to get some idea of what this much questioned article of commerce was like.

The article used for the experiments was obtained from Lehn & Fink, New York. Upon steam distillation, it yielded 25 p. c. of a volatile oil. While the angle of rotation of the balsam in a 100 mm. tube was dextrogyrate to the extent of 4.2°, that of the oil was laevogyrate between 37 and 38°. The specific gravity of the oil was 0.857. As to the constituents of the resin, these will be discussed later.

During the previous summer session, a preliminary experiment had been made by Mr. P. O. Fox. He obtained about 27 p. c. of volatile oil, the sp. gr. of which he records as 0.873 at 20°; and its angle of rotation in a 100 mm. tube as 39° 52′ to the left.

At the same time Messrs. Lehn & Fink were asked for further information. In reply to several queries, the following communication was obtained from them: "Oregon balsam has not taken the place of Canada balsam to any extent and is used possibly in the proportion of 1:5, mainly, we believe, because the color is much darker than that of the Canada balsam. The price of the Oregon product to-day* is 85c. per gal.; Canada balsam is quoted $3.75 per gal. We have no information and can not even estimate the amount that is annually produced and sold. Oregon balsam has been an article of commerce for fifteen years, as near as we can remember."

In response to a request for samples of twigs and cones, the following letter from Dr. J. A. Lamberson of Lebanon, Oregon, addressed to Lehn & Fink, was also received.

"Your letter to S. Heitschn & Co. for samples of twigs and leaves and . . . . from which the Fir balsam is collected, there is two trees, the red and yellow† Fir.

"The wood fiber of the yellow Fir is smooth, something like the pine wood of the Eastern States. I send you in this box several different cones, one of 1903, one of 1902, and one of 1901. These trees grow from a height of 100 to 150 ft. One can find plenty of them near my town, grow from 4 to 8 ft. in diameter."

---

* April, 1903.
† According to Sargent this difference is due merely to the age of the tree.

A query addressed to the Bureau of Forestry of the U. S. Department of Agriculture at Washington, resulted in the following communication from Mr. G. B. Sudworth, Chief of the Division of Forest investigation: "The Bureau of Forestry has not investigated the chemical constituents of the wood or other parts of the so-called *Pinus menziezii*, nor, so far as I know, has any Bureau of the Department done anything with it. I question very much if the Oregon balsam to which you refer is derived from this species. There are a number of true firs, *Abies concolor*, *Abies amabilis*, and *Abies nobilis*, from which a balsam similar to the one of commerce from *Abies balsamea*, is and can be secured in large quantities. Moreover, *Pinus menziesii* is botanically represented at present by *Picea sitchensis*, a spruce of the Oregon Coast region. It is not a pine at all."

At the request of the writer, Mr. R. H. Denniston, Instructor in Pharmacognosy, has identified the twigs and cones received from Oregon. He found them to belong to *Pseudotsuga mucronata* Sudworth, 1895. The list of synonyms was taken from Sargent.[*]

Pinus taxifolia Lam.
Abies " Poir.
A. mucronata Rafin.
A. m. var. *palustris* Rafin.
A. Douglasii Lind. (1833).
P. " D. Don. (1837).
A. " var. *taxifolia* London.
P. " var. *brevibracteata* Antoine.
Picea " Link.
Tsuga " Carr.
T. " var. *taxifolia* Carr.
T. " var. *brevibracteata* Carr.
T. " *fastigiata* Carr.
T. Lindleyana Roezl.
Pseudotsuga Douglasii Carriere (1867).
Ps. " *taxifolia* Carr.
Abies mucronata Carr.

---

[*] Sylva of North America, vol. 12, p. 83.

Pseudotsuga Douglasii denudata Carr.
Pinus Douglasii β-pendula Poulatore.
Pseudotsuga Lindleyana Carr.
Ps. taxifolia Britton (1889).
Ps. " var. *suberosa* Lammon.

Under *Pseudotsuga Douglasii* Carr., with the common names Douglas spruce, Douglas's spruce fir, Red fir, a description of this species will be found in Coulter's Rocky Mountain Botany. (1885.) It is stated to be found throughout the Rocky Mts. and the mountains of California, reaching greatest proportions in Oregon.

Sargent in this Sylva makes no reference to the collection of a balsam from either *Pseudotsuga macronata* or *Picea sitchensis*, although the technical value of the wood and bark of the several coniferous species is dwelt upon.

During the past academic year, the class in phytochemistry again distilled Oregon balsam, also obtained from Lehn and Fink. On an average, somewhat less than 25 p. c. of oil was obtained, of which the sp. gr. and angle of rotation (F. R.) are recorded in the tabulation below. The bulk of the oil distilled below 160°.

* * *

Oleoresin.

The principal constants of the several samples of balsam examined in this laboratory were determined and are, herewith, tabulated. For the sake of ready comparison those of Dowzard are added.

	L. & F. '02.	L. & F. '03.	L. & F. '04.	Dowzard.
Sp. gr.	0.994	1.01	0.985	0.993
α_D	$-1° 16'$	$+4° 13'$	$+2° 30'$	$-3° 12'$
Acid Number	102	103	116	——

For the present at least, no very satisfactory conclusions can be drawn from these figures.

Oil.

The oil obtained by steam distillation had the agreeable terebinthinate odor common to coniferous oils when freshly distilled from oleoresins. The densities and angles of rotation are also tabulated for the sake of better comparison.

	L. & F. '02.	L. & F. '03.	L. & F. '04.	Dowzard.
Sp. gr.	0.873*	0.857	0.822	0.8652
α_D	$-39° 55'$*	$-37° 46'$	$-34° 37'$	$-37° 24'$

---

* Determinations by P. O. Fox.

While the specific gravities show considerable variation, possibly due to the extent to which the distillation was pushed, there is no such great difference in the angle of rotation. The uniformly large laevogyrate angle of rotation would seem to exclude the manufacture of this product from American turpentine oil. Whether any other turpentine oil with so large an angle is available for such purpose the writer is not ready to deny, but at present doubts it.

Although little doubt could be entertained as to the identity of pinene as the principal constituent of the oil, it was thought best to fractionate the oil and to chemically identify this hydrocarbon. The results of the fractionation are recorded in the following table:

OIL 1903.				OIL 1904.		
First Fractionation.		Second Fractionation.			First Fractionation.	
Fractions.	Yield.	Yield.	Fractions.	Yield.	Yield.	Fractions.
		—	—150°	2.95 p. c.		
		—	150—152°	—		
—160°	83.4 p.c.	2.45 p. c.	152—154°	1.85 p. c.	71.8 p.c.	—160°
		29.0 p. c.	154—156°	37.55 p. c.		
		51.0 p. c.	156—158°	40.65 p. c.		
		15.25 p. c.	158—160°	13.15 p. c.		
160-170°	10.9 p.c.	2.8 p. c.	160°+	4.35 p. c.	20.4 p.c.	160-170°
170-180°	2.2 p.c.			—	3.1 p.c.	170-180°
180°+	5.4 p.c.			—	4.5 p.c.	180°+

The first fractionation of both oils indicates their large pinene content; the second fractionation shows that this balsam might conveniently be used for the preparation of a relatively pure leavogyrate pinene. Unless the writer's memory fails him, the principal fractions from Canada balsam, which has been used repeatedly in this laboratory as a source for l-pinene, never boiled as close to the b. p. of pure pinene as did the fractions recorded above.

For the purpose of chemical identification 50 grams of fraction 156—158° of the oil of 1903 were converted into pinene nitrosochloride according to the usual method, however, using amyl nitrite. The yield was but 5 grams. This low yield harmonizes with the observations repeadedly made that the amount of nitrosochloride formed diminishes with the increase in the angle of rotation. The nitrosochloride, melting with decomposition at 106°, was converted into the socalled nitrosopinene, which melted at 125°; and into the nitrol benzylamine base.

Resin.

The crystallization of resin acids from amorphous resins is frequently coupled with difficulty and different methods have been suggested. The writer has found that, in this case at least, the use of glacial acetic acid gave good results, when all other solvents that were used failed.

The first crop of crystals obtained from the 1903 balsam melted at 156—157° (a year later at 147—148°), the second crop at 143° (a year later at 131—132°). Recently a third and fourth crop were separated melting at 127—128° and at 125—126° respectively. From the 1904 balsam four crops have thus far been separated in connection with which the following melting points were observed:

First	154—155°
Second	148—149°
Third	153—154°
Fourth	135—136°

The third fraction was washed more carefully with alcohol than the second, hence, no doubt, the higher melting point. The first set of observations seem to show that even in the form of well developed crystals the acid will undergo changes when exposed to the air.

Of the first crop of acid from the 1903 balsam the angle of rotation in 10 p. c. alcoholic solution was observed to be laevogyrate 3° 37′ for a 100 mm. tube and 7° 13′ for a 200 mm. tube. The acid as such, therefore, must be decidedly laevogyrate. In as much as the oil is strongly laevogyrate and the small amount of resin acid thus far isolated is likewise leavogyrate, the observed angle of rotation of the balsam seems to indicate that there are other constituents in the resin which must be decidedly dextrogyrate. In all probability the acid thus far isolated is abietic acid. In as much, however, as those who are doing most work on resin acids at present do not appear to be able to agree what are the characteristic constants of the resin acids, it may be just as well not to call it by any name until more thoroughly studied.

The further study of this subject should be prosecuted in connection with authentic rather than commercial material. Already steps have been taken to secure material directly from the collectors. If successful in these efforts, the writer hopes to be able to cast more satisfactory light on this disputed subject. This much, however, appears to be true that the statements found in our standard pharmaceutical works are merely based on guess work.

Drugs Used by North American Indians.

In the work of Bartel's entitled "Medizin der Naturvölker" reference is repeatedly made to Schoolcraft's monumental work.[*] In the chapter on drugs and medicaments used by the primitive peoples, he refers to a list given by Schoolcraft as the longest that had come to his attention, but does not reproduce it. While to the student of medical history such a list may be of secondary importance, to the student of pharmaceutical history even its details must prove of the greatest interest.

The list in question was not compiled by Schoolcraft himself, but by Dr. Zina Pitcher of Detroit, Mich., "late U. S. A." He contributes a chapter on "Medicine; or, some account of the remedies used by the American Indians in the cure of diseases, and the treatment of injuries, to which they are liable, and their methods of administering and applying them"[†] in which the list referred to is included.

In as much as pharmaceutical students may not generally have access to the large work of Schoolcraft, it seems worth while to reproduce the list of Dr. Pitcher, together with the introductory and concluding paragraph.

Before doing so, however, it may be well to reproduce from the same source a concluding chapter on "Medical knowledge of the Indian"[‡] devoted to "The Indian as a physician." This short chapter, if the knowledge conveyed be correct, gives some very important information about Indian medicine. We are namely told that a distinction should be made between the magician and the "simple and honest Indian doctor."

In the study of Indian drugs we have to deal exclusively with the latter, who, like all primitive medical pratitioners, is a composite of druggist and doctor. For the sake of a better understanding of this evidently misunderstood and misrepresented character we, herewith, reproduce this short chapter in its entirety, which appears to have been written by the author himself.

---

[*] Information respecting the history, condition and prospects of the Indian tribes of the United States: collected and prepared under the direction of the Bureau of Indian Affairs per act of congress of March 3rd, 1847, by Henry R. Schoolcraft L. L. D. Illustrated by S. Eastman, Capt. U. S. Army. Published by Authority of Congress. Philadelphia: J. B. Lippincott & Co. 1851 to 1855.

[†] Vol. 4, pp. 502—519.

[‡] Vol. 5, p. 455.

"By the descriptions given in the preceding pages of these volumes, of the aboriginal ideas of medical magic, the topic is relieved of one of its chief difficulties, and the arts and ceremonies of a class of influential pretenders to medical knowledge exposed; for it is on this subject, more than any other professing to be useful to their fellow-men, that the Indians bend their efforts. The cure and knowledge of diseases are subjects too interesting, in every wigwam, not to excite an absorbing care. The Indian, seeing cures performed which often strike him as wonderful, and of the rationale of which he is ignorant, soon comes to believe that there is an amount of occult knowledge on this head, which mysterious spiritual influences could only communicate, and the men who profess this art have ever been regarded with the deepest respect.

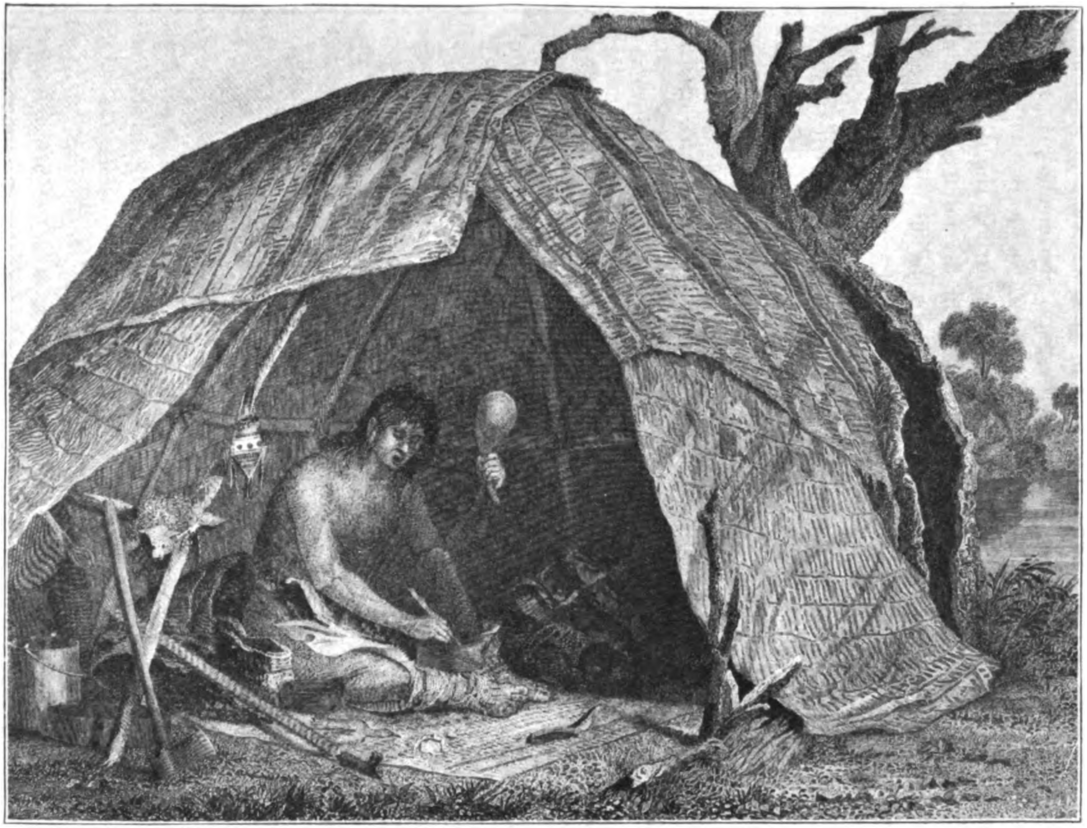
"But it is necessary to distinguish between the simple and honest Indian doctor, or *muskikiwininee*, and the *meda*, or magical professor. The latter is a member of the *medawin*, or grand medicine society. He aims to give efficacy to his skill by necromancy. He shakes the charmed skin of a stuffed weasel, bird, or magic none, at his patient. He uses violent genuflections; he is an adept in incantations. The power of the prophet, or *jossakeed*, goes one step higher. He invokes the spirits, not of his ancestry indeed, who have preceded him to the land of spirits, but of the gods or *monedos*, who are represented on on earth by the various classes of birds, quadrupeds, and reptiles, who have glided in, or flown across, his pathway through life. It is by the superior knowledge of these that he sees into futurity, foretells events, and predicts health, disease, and all the vicissitudes of life. The *mishineway*, who is of the third order of these ceremonialists, is a mere initiate class to these mysteries, and begins his functions in the path to promotion, by lighting the pipe that is to give a sacred character to these institutions.* The Indian physician must not be confounded with these orders. He heals bruises or sores by emollient cataplasms, and attends the cure of wounds and cuts with very great care, and attention to the cleanliness of the injured parts. He administers simples culled from the botanical catalogue, whose laxative, aperient, or other properties, are known to him. He has a general knowledge of the most common disorders of the stomach and bowels. He knows the value of the most unremitting care and attention to the patient who is committed to his hands; and on this, so far as relates to topical cases, his success doubtless often depends. If he concocts his liquid vegetable remedies, on compound theories of the effects on different parts of the system, it is with a simple reliance on the natural powers of the mixture, and not from any faith in the magical doctrines. It is not known that the Indian physician has ever directed his mental vision so far to causes, as to feel the pulse; but it is certain that he becomes satisfied of its fullness by the common remedy of bleeding for inflamations, or fullness or rapidity of its beat.

---

* There is a class of practitioners who are neither truly *medas*, nor medicine-men, but something between, having leanings to the higher ceremonial exhibitions of the art. Their mode of administering medicine is after this sort. Having prepared to give the remedy to the patient, he addresses it as if it were a sentient person, in this manner, saying, "You have been created for the use of man; you will perform the office for which you have been designed; you will cleanse this man's body; you will act like one who sweeps clean, and cleans all that is hurtful to him; and if you are too powerful, you must return from the patient's body, without injuring him."

"It is this class of practitioners who, by their care and devoted personal attention; are so generally useful. There is known to them a forest materia medica, and a pathology which regulates the practice; and we cannot doubt that they much mitigate the diseases and accidents of Indian life, and deserve to be regarded as benefactors to their race.

"To ascertain these practices, reference has been made to physicians of established reputation and judgment, who have been much thrown into contact with Indian society on the frontiers, whose contributions to a true knowledge of the subject have been given in prior volumes. The paper of Dr. Pitcher derives especial value from the botanical list of plants employed by the aborigines as of remedial worth; and it is worth of remark, denoting, as it does, much accuracy of observation in the Indian practitioners, how generally the properties ascribed to them coincide with those attributed to the same plants in civilized practice. By exhibiting a view of the old state of physical knowledge during the mediaeval ages, there is a benevolent abatement of the tone with which we ought to regard the Indian superstitions. To acquire this knowledge of the actual skill possessed by the Indian physician, that it might be exhibited in contradistinction to his superstitious practices, appeared to the author important; and having accomplished this object, his task is terminated."



INDIAN DOCTOR CONCOCTINGA POT OF MEDICINE,

To the above account there is, herewith, added the list of Dr. Pitcher with his brief comments.

"Instead of arranging the articles of their meteria medica under their appropriate classes as medicinal agents or remedies, I propose to subjoin a simple catalogue of the plants used by the various nations ranging from Lake Superior to the mouth of the Mississippi. This accords best with the Indian idea, as in his mind there is no classification—no subdivision of remedies into the subordinate groups of emetics, cathartics, narcotics, sudorifics, etc. They are used in savage, as in domestic practice in civilized life, for their general effects, rather than with reference to the qualities by which they are distinguished from each other by scientific minds. Their more characteristic properties will be indicated as follows:

NAME OF PLANTS.	PROPERTIES OF PLANTS.
Sambucus canadensis	Diuretic and aromatic bark used as a cataplasm.
Sambucus pubescens	
Rhus glabra	Poison, astringent and tonic.
Arabis dentata	Antiscorbutic and nutritious.
Tradescantia virginica	Tonic.
Allium canadense	Stimulant and expetorant.
Yucca filamentosa	Demulcent and emollient.
Acorus calamus	Acrid, aromatic.
Rumex aquaticus	
Rumex crispus	
Alisma plantago	Used in hydrophobia.
Aesculus glabra	Febrifuge. The cambium made into a pill acts as a cathartic.
Polygonum punctatum	Rubefacient and acrid, stimulant.
Laurus benzoin	Aromatic, antispasmodic.
Laurus sassafras	An expectorant.
Chimaphila maculata	Diuretic.
Chimaphila umbellata	"
Ledum palustre	Tonic and astringent.
Ledum latifolium	" " "
Clethra alnifolium	Diuretic.
Melia azedarach	Diuretic and anthelmintic.
Gaultheria procumbens	Aromatic and astringent.
Spirea tomentosa	Tonic and astringent.
Gillenia trifoliata	Diaphoretic.
Leptendra virginica	Antidote to snake-bite.
Lycopus europea	Aromatic, tonic.
Monarda (different species)	Carminative, etc.
Fedia radiata	Vermifuge, sedative.
Valeriana sylvatica	Sedative.
Mullugo verticillata	Demulcent.
Cephalanthus occidentalis	Tonic.
Isnardia palustris	Emollient.

Euphorbia corollata	Emetic.
Ictodes foetida	A remedy in asthma.
Pulmonaria virginica	Tonic.
Spigelia marylandica	Anthelmintic and narcotic.
Triosteum perfoliatum	Emetic.
Ribes trifolium	Diuretic.
Gentiana saponaria	Tonic.
Ulmus americana	Emollient
Ulmus alata	Tonic.
Ligustricum scotium	Aromatic and expectorant.
Juglans cineria	Cathartic.
Salex (willow)	Tonic and febrifuge.
Hieracium gronovii	Antidote to snake-bite.
Liatris spicata	Diuretic. Antidote to snake-bite.
Eupatorium perfoliatum	Emetic—cathartic and tonic.
Artemisia canadense	Tonic.
Achillea multifolium	Tonic and secernent, stimulant.
Asclepias tuberosa	Emetic.
Apocynum cannabinum	Emetic and sudorific.
Geum rivole	Febrifuge.
Tilia glabra	Demulcent and diuretic.
Leonurus cardiaca	Tonic and carminative.
Mentha viridis	Aromatic.
Abutilon avicenna	Mucilaginous.
Malva rotundifolia	"
Prenanthes alba	Antidote to snake-bite.
Polygala senega	(Diaphoretic, expectorant, and antidote to snake-bite.

"I am aware that such of your readers as have only looked casually into this subject, may feel that the list of medicinal plants, purporting to be used by the savages of the United States, has been unjustifiably enlarged; and even those who are better informed on the subject, may think it strange that they should have appropriated to their use so large a proportion of the most valuable articles of the materia medcia of the country. It is not my design to convey the idea that any one tribe is familiar with any considerable part of the catalogue. If, however, it is considered for a moment that the country occupied extends from the Lake of the Woods to the Gulf of Mexico, it need no longer appear strange that the catalogue of remedies, which includes the *Ledum-palustre*, (Labrador tea), on the one side, and, on the other, a native of Florida—the *Yucca filamentosa*, (silk grass,)—should embrace a good many species. There is no denying the fact, that either by their discernment, or the force of an unerring instinct, they have been guided to a knowledge of a good proportion of the medicinal plants indigenous to their respective sections of country.

Literary.

Books Reviewed.

JAHRESBERICHT DER PHARMACIE. Herausgegeben vom Deutschen Apothekerverein. Bearbeitet von Dr. Heinr. Beckurts. Unter Mitwirkung von Prof. Dr. G. Frerichs. 37. Jahrgang, 1902. (Der ganzen Reihe 62. Jahrgang.) Erster Teil. Ein Bd., pp. 1—288. Vandenhoeck & Ruprecht, Göttingen. 1903. M. 10.00.

The praises of the Jahresbericht as a work of reference have so often been sung in the pages of this journal that a special account of the first part of the volume for 1902 seems superfluous. We desire, however, to call attention once more to the reduced price (M. 175.00) at which the first thirty-two volumnes (1866 to 1897) can be obtained. There is no longer any excuse why a set of these series should not be found in every college library and every laboratory attached to a manufacturing establishment. Those who have not had the good fortune of acquaintance with the "Jahresbericht" should order a volume at once and seek a better acquaintanceship than even the best review can afford. *E. K.*

PRANTLS LEHRBUCH DER BOTANIK, herausgegeben und neu bearbeitet von Dr. Ferdinand Pax, Professor der Botanik und Director des Botanischen Gartens der Universität Breslau. 12te verbesserte und vermehrte Auflage. Ein Band, 478 Seiten mit 439 Abbildungen. Verlag von Wilhelm Engelmann in Leipzig. 1904.

The first edition of this standard text-book of botany by the late Professor Prantl appeared in the year 1874. The first seven revised editions were edited by the original author, who died in 1891. Since then four more revised and enlarged editions have been issued, edited by his successor in Breslau, Prof. Dr. Ferd. Pax.

The elaborate work at once met with general appreciation and due success and has ever since maintained a foremost position among the leading text-books of botany for study and reference. By the prompt incorporation of every new addition to the stock of botanical knowledge its consecutive new editions have kept the work fully apace with the progress of science. The merits and advantages of the book, its superiority both in a precise and lucid style and the excellence of the great number of illustrations have been set forth in former reviews in the pages of this Journal, so that the book needs no further commendation. The 12th edition has been enriched by a concise descriptive chapter an pharmacopœial plant drugs (pp. 442—454) of considerable value to students of materia medica.

Fr. Hoffmann.

DIE ANALYTISCHEN REACTIONEN DER TECHNISCH WICHTIGEN ELEMENTE. Mit Anhang: Anleitung zur Aufsuchung und Trennung der Elemente. Von Dr. Alexander Just. Ein Bd., pp. VIII, 130, mit 19 Abbildungen. A. Hartleben's Verlag. Wien. 1904.

There is certainly no derth of guides to analytical chemistry, many of which are good and certainly much more comprehensive than the little volume before us. Yet we should like to say a good word for volume 278 of the "Chemisch technische Bibliothek" of the well known Vienna firm.

The book is not intended as college text book, but is compiled as an aid to the ambitious apprentice who desires to learn without the advantage of a college laboratory and instructor. We have no doubt that as such it may do much good, in fact stimulate the beginner who has acquired a taste to demand something more.

True to its aims, the printed guide advises the tiro how to equip his unpretentious laboratory with a few but necessary apparatus, how to prepare his reagents and then how to begin work in good ernest.

American pharmaceutical apprentices, who have a reading knowledge of German, may well be urged to secure such a guide as this, not as a "substitute for something better" but merely as a temporary makeshift until higher aspirations can be satisfied.

E. K.

BULLETIN OF THE NEW YORK BOTANICAL GARDEN, Vol. 3, No. 10. Issued March 22, 1904.

This bulletin contains the reports of the director and other officers of the garden for the year 1903. Gratifying progress is shown, both in material equipment and in the quantity and quality of the research which the facilities of the garden make possible. Notable among a vast amount of other work were exploring and collecting trips undertaken by the following persons during the year: Mr. F. S. Earle, Prof. L. M. Underwood and Mr. E. W. D. Holway, in eastern Cuba; Mr. Percy Wilson, in Honduras; Prof. Underwood, in Jamaica; Dr. M. A. Howe, in Porto Rico; Prof. and Mrs. T. E. Lloyd, in Dominica; Mr. George V Nash and Mrs. Harry F. Baker, in Haiti; Prof. and Mrs. N. L. Britton, Mr. J. A. Shafer and Mr. Percy, in Cuba; Mr. R. S. Williams, in the Philippines; and Dr. John K. Small in Florida. The income of the garden for the year was $154,277.18; the expenditures were $129,195.75. There were added to the museum and herbarium collections, by gift, purchase, exchange and exploration, 85,750 specimen. The number of bound volumes in the library on December 28th was 14,591, of which 1,656 were added during the year. Special investigations, aside from those of the regular staff, were carried on at various times during the year by forty-six persons, representing, by degrees received or by incumbencies held, forty institutions of collegiate rank or scientific purpose.

Chas. E. Allen.

BUCHFÜHRUNG IM APOTHEKENBETRIEBE nach einfachem System, angewendet auf mittlere und kleine Apotheken. Ein Leitfaden zur Erlernung der Apothekenbuchführung für Apotheker und Studierende der Pharmazie. Von Dr. Josef Barber, Apotheker in Czernowitz und V. Schestauber, Lehrer der kommerziellen Fächer an der k. k. Staatsgewerbeschule in Czernowitz. A. Hartleben's Verlag, Wien. 1904.

Only a few years ago a great ado was made about the establishment of a "business course" in connection with colleges of pharmacy. The writer was struck at the time with the attitude of a number of men who, while pleading for the establishment of such courses, did so in a manner as to discredit greatly the practical training apprentices and clerks are supposed to acquire in the drug store. If the preceptor does not find the time that is necessary to acquaint the "students" in his charge with the simple business forms of every day business practice, how much time may he be expected to devote to the technical training of those who are willing to work for him for a mere pittance in order to learn the business." If it is necessary for American colleges of pharmacy to take even a small fraction of the valuable time of their students to teach them how to write checks, how to formulate a simple business letter and how to keep simple accounts, it shows two things: first, that the preliminary education of those students is such that they ought not to have been admitted to any professional school; and second, that the apprenticeship which the young men enjoyed before entering college must have been the merest excuse of what it ought to have been.

While we have been discussing the value of business training as a part of a college course, our German and Austrian colleagues have been providing books that might serve as aid to those who are in need of it. Such books have long existed in German pharmaceutical literature and the book before us is an addition to this class.

The first part is „theoretic" or information of the general principles of bookkeeping. The second part takes the assumed business of a month and shows in detail how it should be booked. We would advise all who are interested in this practical subject to secure a copy and learn how some of our colleagues have disposed of this question in a manner that is superior by far to all debate. *E. K.*

P. J. F. THE PHARMACEUTICAL JOURNAL FORMULARY. A register of formulæ for medicinal preparations sold by chemists and druggists, and regarded by the Board of Inland Revenue as "known, admitted and approved" remedies, together with collections of useful recipes for galenical preparations, veterinary medicines, photographic solutions, dental preparations, perfumes, toilet requisites, and various other preparations in every-day use. Edited by John Humphrey. One vol., pp. XXVI, 812. The Pharmaceutical Journal Office. London. 1904. 21S.

A few years ago some of the members of the Pharmaceutical Society of Great Britain had considerable fault to find with the "Pharmaceutical Journal." One of the causes for complaint was that it was too scientific and did not sufficiently meet the every-day needs of the practicing pharmacist. The other was that they did not get the journal for nothing.

Since then several changes have been made which manifest themselves not only in the management and appearance of "The Journal," but from the Journal Office there has been issued this year a volume for which at least some of our bretheren of the British Isles apparently have nothing but praise. It does not demand a Bloomsbury Square diploma as a prerequisite for its use or appreciation. Within a few weeks after its publication five thousand copies are reported as having been sold. It is primarily a pharmaceutical cook book and contains a lot of information that appears to have been kept secret heretofore. The popularity of the book apparently cannot be doubted. The Journal Office evidently has scored.

While of book making there has been no end even before the printing press was invented, it can scarcely be said that there has existed a derth of pharmaceutical formularies. However, a special reason appears to have existed to cause the quick compilation of this large quarto volume. It is announced as a "result of fresh interpretations of the Medicine Stamp Duty Acts" by the Board of Inland Revenue. The book is to be "regarded as a register of recipes for compounded medicines prepared and sold by chemists and druggists, under names which are now held to incur liability to Medicine Stamp Duty unless the composition of medicines be disclosed."

If in this country we had enjoyed a similar interpretation only a few years ago, some of our cooperative pharmacal companies might have issued dividends instead of spending their legitimate profit for revenue stamps. Moreover, might not the editor of the "Ladies Home Journal" have been informed directly by the manufacturers as to the alcohol etc. content of their nostrums? Yet this is doubtful, for some manufacturers can better afford to buy revenue stamps than to give publicity to their concoctions.

However this may be, the ruling by the Board of Inland Revenue has, no doubt, been productive of much good in placing above board many a formula which formerly was kept secret. While we have no desire whatever, to reflect upon the author's mottos, one of which is a quotation from Bacon, viz.: "I hold every man a debtor to this profession," etc. and while we would gladly believe that many a British pharmacist might have published, upon request, his private formulas even if no pressure had been exerted from above in the way of a reduction of the stamp tax, we cannot but believe that these gifts to their professional bretheren on the part of British chemists and druggists are only secondary in professional merit to the moral effect of their mere publication, irrespective of profit or loss to any one. Secrecy, while, no doubt, often a commercial necessity is a professional sore. Wherever commercial conditions can be so modified as to result in a healing of the sore, though it be with the aid of the surgeon's knife, we certainly have reasons to congratulate ourselves.

The N. A. R. D. in this country is battling with the "patent medicine" incubus. From the very beginning of this organization, some of us have believed that it was not attacking the problem in the right manner. The threats pronounced by the officers of this association at the recent meeting of the Proprietaries Association have not even been able to convince us that they have enjoyed a great measure of success in the direction of their attack, though certainly time, money and energy have been spent lavishly.

We would strongly recommend to the officers of the N. A. R. D. that they not only purchase a copy of the P. J. F., but that they study the conditions in England that gave rise to its compilation. If the retail druggists had fought as hard for a similar solution of the revenue stamp act in this country at the time of the Spanish-American war, the "patent medicine" men would not have had it all their own way before Congress and cooperative pharmacal companies might have paid higher dividends.

But now as to the Formulary itself. Its publishers boast of its being "the largest compilation of the kind ever published, containing ten thousand recipes supplied from their private recipe-books by more than two thousand chemists." These figures may speak for themselves.

Hastily compiled to meet a newly created demand, the editor not only admits inevitable shortcomings, but invites criticism by issuing a card on which are to be noted "errors" and "comments or suggestions." Certainly the good will to improve the book is not wanting and shows itself in a manner that ought to be productive of positive results.

In addition to the ten thousand recipes mentioned above, "the volume comprises much other information which the retail chemist will find useful in business." As to this claim, the table of contents may speak for itself, the pages being added that the reader may judge of the relative importance of each chapter in so far as this finds expression in the amount of space devoted to it.

I.—A Supplement to the Pharmacopœa. (1)
II.—The Preparation of Compressed Tablets. (73)
III.—Chemists' and Druggists' Recipes. (81)
IV.—Selected Remedies for Common Ailments. (615)

V.—Recipes for Dental Preparations. (623)
VI.—Formulæ for Veterinary Medicines. (631)
VII.—Perfumes and Toilet Preparations. (649)
VIII.—Miscellaneous Recipes. (693)
IX.—Histological and Bacteriological Stains and Reagents. (713)
X.—Urine Analysis—Reagents and Tests. (727)
XI.—Photographic Chemicals and Formulæ. (735)
XII.—Legal Hints for Chemists and Druggists. (755)
XIII.—Acts of Parliament. (763)
XIV.—Poisons and Antidotes. (789)
XV.—Standards and Medicines. (795)
XVI.—Trade Directory and Buyers' Guide. (801)
XVII.—Postal Information. (804)
XVIII.—Information for Nurses and Dispensers. (807)
XIX.—Metric Measures and Profit Assessment Tables. (808)
XX.—Schools and Colleges of Pharmacy. (809)

One fact certainly becomes apparent from the above table of contents, viz. that the author did not worry over the dictionary definition of the word "Formulary." He was evidently intent on placing between two covers as much "practical" information for British chemists and druggists as he could compress between them. The first reception certainly must have been more than satisfactory to the author and no less so to the officers of the Pharmaceutical Society of Great Britain. That many an American pharmacist will not only have his curiosity arroused by its reception, but will find the volume useful in many respects can scarcely be doubtful. *E. K.*

THE VEGETABLE ALKALOIDS. With particular reference to their chemical constitution. By Dr. Amé Pictet, Professor in the University of Geneva. From the second French edition. Rendered into English, revised and enlarged, with the author's sanction, by Dr. H. C. Biddle, Instructor in the University of California. First edition. John Wiley & Sons. New York. 1904. $5.00.

With the classification of natural objects into the three kingdoms, the mineral, vegetable and animal, it was but natural for chemistry, which dealt with these objects from a certain point of view, to adopt a similar classification. As the knowledge of chemical substances advanced, it was found that vegetable as well as animal products had many substances in common. Hence it was proposed by Bergmann to drop the distinction between vegetable and animal. In the course of time the classification into inorganic and organic was generally adopted, but although it was known that both vegetable and animal organisms contained mineral or inorganic constituents, the typical organic constituents found in them were regarded as being the resultants of a life force not operative in the inorganic world. With the synthesis of typical organic substances from their elements, this distinction also had to be dropped.

Although we no longer regard vegetable and animal products and the host of artificial organic substances as obeying different chemical laws than those not containing the element carbon, we yet find it very convenient to speak of a biochemistry or chemistry of living objects; of a plant- or phytochemistry and of a zoochemistry or a chemistry of animals. So long as the scientific world recognizes the departments of botany and zoology, so long such a classification of chemistry will not only be convenient, but it will in all probability be rational as well. There will be no harm in any classification, though it represents but a particular point of view, provided this limitation be borne in mind and exercise no undue influence on our conceptions or judgements.

The enormous development of chemistry during the past century has made specialization an absolute necessity to the investigator. It is, therefore, not only in harmony with the historical development of the science, but equally in harmony with the present conditions that the realm of chemistry should be divided and subdivided into numerous realms for the purpose of investigation. According to the point of view, the plat of the field will naturally vary and they will not all be equally in harmony with a strictly scientific conception.

It has been claimed that modern plant chemistry began with Scheele's investigations, because it was he who recognized the importance of the proximate plant constituents over those of supposedly more remote nature which resulted from the pyrochemical method of plant analysis.

Be this as it may, the development of plant chemistry has been equally phenominal with the development of any other branch of chemistry since the time of the illustrious Swedish apothecary-chemist. It is but necessary to glance at a chemical treatise of a century ago. We find in the most advanced treatises of those days that e. g. "sugar" is a constituent of plants. Today the chemistry of the sugars is a field by itself in chemical research. About a half century later another great Swedish chemist, Berzelius, in his handbook; the repeated revisions of which were as many guides to the chemical world, points out that his list of alkaloids—a fairly respectable one—must be a very imperfect one because of the limited time that had transpired since the discovery of the first. The last decade has not only witnessed the growth of a respectable book literature on the subject, but, like the air, well known alkaloidal drugs have been made to give up new basic constituents where they apparently were oftimes least expected.

Like in the domain of organic chemistry at large, the discovery of new plant substances and their derivatives had soengrossed the attention of the investigator that he rarely found time and leisure to properly classify the new material and to take a broad view of the situation. As a result we have in the several sub-departments of plant chemistry masses of material that have not been properly digested. The volatile constituents of plants are still under the ban of "terpenes and camphors", the so-called sugars under the empirical concept of carbohydrates, the alkaloids are still presented from the point of view of the theory of types which was exceedingly useful indeed during the middle of the nineteenth century, but which as a single view point has long been replaced by one more rational and more in harmony with the present state of organic chemistry.

Organic chemistry may be defined in several ways, but for purpose of classification it is commonly regarded as the chemistry of the hydrocarbons, as basal substances, and their substitution products. If this is a rational fundamental concept, applicable to the entire field, it should constantly be borne in mind in viewing a particular section.

It is perfectly proper to point out that the alcohols may be regarded as mono alkyl substitution products of water as they were during the predominance of the theory of types. It is equally proper —and the larger the number of points of view taken the better— to regard the alcohols as substitution products of carbinol, as some of them were later classified by Kolbe But to present a monograph on the alcohols from either point of view would be regarded as ridiculous, yet many alkaloidal chemists are still satisfied to study alkaloids from such a narrow point of view and to introduce others into the study of the subject from such a forced point of view though they admit that many alkaloids will not submit to such treatment.

What is an alkaloid anyway? Let us try to find out historically. Plant acids, such as citric, tartaric and oxalic acids helped lay the foundation to modern plant chemistry. They and their salts naturally attracted much attention, which was increased because of their economic value and physiological import. At a time when inorganic chemistry was largely a study of acids, bases and salts interpreted in the light of the antiphlogistic theory of Lavoisier; when the infant organic chemistry was still leaning strongly on its older inorganic sister, it was but natural that the discovery of bases containing carbon should attract considerable attention. The same substances isolated more than a decade before without, however, the recognition of its basic properties passed unnoticed. The basic property of this carbon compound its capacity to form salts with acids was morphine's claim to distinction. The fact that plant substances now fell in with the classification of inorganic compounds, was the remarkable truth that was heralded throughout the chemical world. Hence the name alkaloid, like alkali, like the basic soda and potassa. The therapeutic significance of Sertürner's discovery, which lead other pharmacists in a short time to find a considerable number of alkaloids in narcotic drugs, did not alter the chemical aspect an iota.

Such a basic substance having first been isolated from a plant product, the term alkaloid at once became synonymous with plant base. In a restricted sense this is its original meaning.

That with the development of organic chemistry, basic substances containing carbon should be found in animal organs, that they should be produced synthetically as well no longer surprises us who can look backward. Have we not even outgrown nitrogen bases and speak of iodine bases and even oxygen bases, bases containing an element, the very name of which was given to it because it was a former of acids.

A mere hint at this development should reveal to us the difficulties that had to arrise. Chemical definitions based on properties have always proven stumbling blocks. Was not even salt at one time no longer a salt according to chemical definition, though it had given its name to the entire class? Kekulé, the genial chemical philosopher, used to delight in proving to his students that water, this indifferent chemical substance, was first of all an acid; then according to commonly accepted definitions he would prove it to be a base, and finally a salt. It cannot surprise, therefore, that his students carried away with them a disgust for all such definitions.

With the development of organic chemistry, the "pure" chemists "took a hand" in the study of alkaloids, the discovery of which had made more than one of their pharmaceutical colleagues famous. They were not so much interested in finding new bases in narcotic drugs not yet examined, as they were in the study of those already found from the point of view of the prevailing theories.

The theory of types, promulgated by Hofmann in connection with aniline and its derivations found its application, and to-day textbooks refer to the alkaloids as derivatives of ammonia, when, with equal propriety all carbon compounds might be referred in like manner to methane.

Pyrochemical analysis, which has been denounced again and again for having been one of the greatest obstructionists to a rational development of plant chemistry, in a modified and modernized form stepped in once more, and as a brilliant thought we have Koenig's definition that alkaloids are derivations of pyridine. The very name of this new type for alkaloids smells of fire and it would seem as though something inherently evil were associated with it. The supposed scientificness of this definition at once made it a favorite with chemists, and we have to-day before us a treatise, the first part of which is a monograph of pyridine and the related quinoline, though its author points out in the introduction that, even after caffeine and the other members of the highly interesting caffeine group an eliminated, König's definition does not by any means cover the ground. To say nothing of reduced pyridine and quinoline nuclei, there are the oxazine ring in morphine, the pyrrolidine ring in hygrine and nicotine, and the glyoxaline ring in pilocarpine, to say nothing of the still greater variety of nuclei to be discovered in alkaloids, the constitution of which is not yet known.

Is pyridine so all important to the study of alkaloids, because of König's visionary hit? Is it not time, rather, to move away from positions, the fallacy of which has long been recognized, though they possess a grain of truth? Let us look at these things more broadly. The just claim for extreme specialization lies in the application of the broadest knowledge to a narrow field in order that this field may be best cultivated and yield the greatest possible returns. To insist on or even to emphasize a narrow standpoint is to discredit specialization. It is not only the duty of the specialist to produce the greatest possible harvest, but it is equally his duty to glean the harvested products and to make them available to his colleagues in such a manner that they in turn can utilize them to greatest advantage. To do this, however, does not call for special manipulative skill and inventiveness, but for a broad philosophical mind.

In conclusion a few words on the merits of the book that has caused the writer to point out once more the great crying need of the hour. The first part, which seems so inadequate a general introduction to the study of the alkaloids, does not occupy more than about one-fifth of the book. Not that the writer has fault to find with this part for any other reasons than those given above The second part is devoted to "The natural alkaloids." It is this, the major portion of the book, in which its value lies.

Though we are not without other good books on the subject, we are exceedingly grateful to those who in short intervals provide us with up-to-date compilations of this kind. It is impossible for the busy investigator to keep abreast with the details of investigation in other fields, sometimes even in closely related fields of research. We should have words of commendation only, therefore, for such compilation provided it be well done.

With the rapid progress now being made in the study of the structure of the alkaloidal molecules, we are under obligation to the translator for having brought the information up to date as far as possible. Thus e. g. in the chapter on "Solanum alkaloids", while atropine and byoscyamine are still discussed in separate subchapters, the reader is informed that, according to the recent investigations of Amenomiya, the final synthetic proof has been brought that these two substances are chemically identical and physically different only in their optical properties. No reference, however, is made to the physiological differences of d- and l-byoscyamine predicted by Cushing.*

The treatment of each article rests on an historic basis and references are numerous. While the natural grouping of alkaloids is carried out in most of the chapters has much in its favor, it is not carried out in strict consistency. In addltion to the twenty-eight chapters on as many groups of alkaloids the constitution of the members of which is known or supposed to be known, a final chapter is devoted to alkaloids of unknown constitution. Forty-two alkaloids or groups of alkaloids are briefly mentioned, thus revealing the fact that even among the known alkaloids much work still remains to be done.

All in all, we welcome this first English edition of Pictet's well and favorably known work as another timely contribution to the rapidly growing literature on plant chemistry. *E. K.*

---

* Proc. A. Ph. A., 51, p. 153.

Pure Granulated Salts.

We make a large line of these salts and earnestly recommend them for elegant dispensing. They are of exceptional purity, make brilliantly clear solutions, and cost no more than the ordinary crystals. Ask for our original packages.

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street
PHILADELPHIA
111 Fifth Avenue
NEW YORK

LIVERPOOL, England. To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. Price, 77 Lord Street, Liverpool, England.

BLOCKI'S

IDEAL **Perfumes** IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich.

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High Grade Guaranteed Bicycles.

New 1903 Models

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High Grade	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

Any other make or model you want at one-third usual price. Choice of any standard tires and best equipment on all our bicycles. *Strongest guarantee.*

We ***SHIP ON APPROVAL*** C. O. D. to any one *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels taken in trade by our Chicago retail stores, all makes and models, good as new............ **$3 to $8**

ESTABLISHED 12 YEARS

DO NOT BUY a bicycle until you have writen for our **FACTORY PRICES AND FREE TRIAL OFFER.**

Tires, equipment, sundries and sporting goods of all kinds, at half regular price, in our big free sundry catalog. Contains a world of useful information. Write for it.

J. L. MEAD CYCLE CO., Chicago, Ill.

The Open Court

AN ILLUSTRATED MONTHLY MAGAZINE

Devoted to the Science of Religion, The Religion of Science and the Extension of the Religious Parliament Idea.

10 cents per copy - - - - - - - $1.00 per year

SCIENCE is slowly but surely transforming the world. Science is knowledge verified; it is Truth proved; and Truth will always conquer in the end. The power of Science is irresistible. Science is the still small voice; it is not profane, it is sacred; it is not human, it is superhuman; Science is a divine revelation.

Convinced of the religious significance of Science, *The Open Court* believes that there is a holiness in scientific truth which is not as yet recognized in its full significance either by scientists or religious leaders. The scientific spirit, if it but be a genuine devotion to Truth, contains a remedy for many ills; it leads the way of conservative progress and comes not to destroy but to fulfil.

The Open Court on the one hand is devoted to the *Science of Religion*; it investigates the religious problems in the domain of philosophy, psychology, and history; and on the other hand advocates the *Religion of Science*. It believes that Science can work out a reform within the Churches that will preserve of religion all that is true, and good, and wholesome. Sample copies of *The Open Court* sent on request together with illustrated catalogue of important publications for the Study of Religion. Published by

THE OPEN COURT PUBLISHING COMPANY, 324 Dearborn St., Chicago.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

NEW NOVELS.

The day of the dog, by George Barr McCutcheon. (Dodd, Mead)	$1.25
Sir Mortimer, by Mary Johnston. (Harpers)	1.50
My Mamie Rose, by Owen Kildare. (Baker & Taylor) Net	1.50
Tillie, a Mennonite maid, by H. R. Martin. (Century)	1.50
The crossing, by Winston Churchill. (Mac Millan Co.)	1.50
The seiners, by James B. Connolly. (Chas. Sribner's Sons)	1.50
Evelyn Byrd, by George C. Eggleston. (Lothrop)	1.50
Brave hearts, by W. A. Fraser. (Chas. Scribner's Sons)	1.50
The Barrier, by Allen French. (Doubleday, Page & Co.)	1.50
The light of the star, by Hamlin Garland. (Harpers)	1.50
The singular Miss Smith, by Florence Morse Kingsley. (MacMillan)	1.25
The faith of men and other stories, by Jack London. (McClure, Phillips)	1.50
By snare of love, by Arthur W. Marchmont. (Stokes)	1.50
Bruvver Jim's baby, by Philip V. Mighels. (Harpers)	1.50
The Villa Claudia, by John A. Mitchell. (Life)	1.50
Anna the adventuress, by E. Phillips Oppenheim. (Little, Brown)	1.50
Bred in the bone, by Thos. Nelson Page. (Chas. Scribner's Sons)	1.50
The cost, by David Graham Phillips. (Bobbs-Merrill Co.)	1.50
The flame-gatherers, by Margaret Horton Potter. (MacMillan)	1.50
The by-ways of Braithe, by Frances Powell. (Chas. Scribner's Sons)	1.50
Fort Amity, by A. T. Quiller-Couch. (Chas. Scribner's Sons)	1.50
The castaway, by Hallie Erminie Rives. (Bobbs-Merrill) Net	1.00
The bright face of danger, by Robert Neilson Stephens. (Page)	1.50
A gingham rose, by Alice Woods Ullman. (Bobbs-Merrill)	1.50
The descent of man, and other stories, by Edith Wharton. (Chas. Scribner's Sons)	1.50
Kings and Queens I have known, by Helene Vacaresco. (Harpers) Net	2.00
The Republican Party, by Francis Curtis. 2 vols. (Putnams) Net	6.00
Human work, by Charlotte Perkins Gilman. McClure, Phillips) Net	1.50
Working with the hands, by Booker T. Washington. (Doubleday, Page) Net	1.50
Addresses and Presidential messages, by Theodore Roosevelt. (Putnams)	1.25
New Hampshire, by Frank B. Sanborn. (Houghton, Mifflin) Net	1.10
The mystic mid-region; the deserts of the Southwest, by Arthur J. Burdick. (Putnams) Net	2.00
Whittier-land, by Samuel T. Packard. (Houghton, Mifflin) Net	1.00
Olive Latham, by E. L. Voynich. (Lippincotts)	1.50
The woman errant, by the author of "The garden of a commuter's wife. (MacMillan)	1.50
The grafters, by Francis Lynde. (Bobbs-Merrill)	1.50
The second Mrs. Jim, by Stephen Conrad. (Page)	1.00
The givers, by Mary E. Wilkins Freeman. (Harpers)	1.25
In search of the unknown, by Robert W. Chambers. (Harper)	1.50
A Texas matchmaker, by Andy Adams. (Houghton, Mifflin)	1.50
Later adventures of Wee McGregor, by J. J. Bell. (Harper)	1.25
The daughters of desperation, by Hildegarde Brooks. (McClure, Phillips)	1.25
The queen's quair, by Maurice Hewlett. (MacMillan)	1.50
The Merry Ann, by S. Merwin. (MacMillan)	1.50
Said, the fisherman, by M. Pickthall. (McClure, Phillips)	1.50
Order No. 11, by C. A. Stanley. (Century)	1.50
A woman's will, by Anna Warner. (Little, Brown)	1.50
The rainbow chasers, by J. H. Whitson. (Little, Brown)	1.50
The Test, by M. T. Wright. (Scribners)	1.50
Sally of Missouri, by R. E. Young. (McClure, Phillips)	1.50
Uncle Mac's Nebraska, by W. R. Lighton. (Holt)	1.25
The shame of the cities, by Lincoln Steffens. (McClure, Phillips) Net	1.20
By the fireside, by Chas. Wagner. (McClure, Phillips) Net	1.00
Nancy Stair, by Elnior M. Lane. (Appletons)	1.50
Nature's comedian, by W. E. Norris. (Appletons)	1.50
My li'l' Angelo, by Anna Y. Condict. (Appletons)	1.25
Man and Superman, by G. Bernard Shaw. (Brentanos) Net	1.25
Elizabeth's adventures in Rügen. (MacMillan)	1.50
The Penobscot man, by Fannie H. Eckstorm. (Houghton, Mifflin)	1.50
The great adventurer, by Robert Shackelton. (Doubleday, Page)	1.50
Bird center cartoons, by John T. McCutcheon. (McClure) Net	1.25
The highroad, being the autobiography of an ambitious mother. (Stone)	1.50
The issue, by George Morgan. (Lippincotts)	1.25
The double garden, by Maurice Maeterlink. (Dodd, Mead) Net	1.40

BAEDEKER'S GUIDE BOOKS.

Illustrated with numerous Maps, Plans, Panoramas and Views.

12 mo., cloth flexible. Prices are net.

The United States. With an Excursion into Mexico. (New Edition)	$3.60
Canada. (New Edition)	1.50
Austria	2.40
Eastern Alps	3.00
Egypt	4.50
France (Northern)	2.10
Germany (Northern)	2.40
Germany (Southern)	1.80
Great Britain	3.00
Greece	2.40
Italy, Northern	2.40
Italy, Central, and Rome	2.25
Italy, Southern, and Sicily	1.80
London and its Environs	1.80
Norway, Sweden, and Denmark	2.40
Palestine and Syria	3.60
Paris and its Environs	1.80
Rhine	2.10
Switzerland	2.40

Postage additional about 10%.

Stedman, Complete Pocket-Guide to Europe. Flexible Leather, postpaid	$1.50

GRANT ALLEN'S HISTORICAL GUIDES.

Paris, by Grant Allen	$1.25
Florence, by Grant Allen	1.25
Cities of Belgium, by Grant Allen	1.25
Venice, by Grant Allen	1.25
Cities of Northern Italy, by G. C. Williamson	1.25
Umbrian Towns, by Mr. & Mrs. J. W. Cruickstank	1.25

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,

MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

EXTRACT OF BEEF
MADE ACCORDING TO PROCESS OF
PROF. JUSTUS VON LIEBIG
FROM FRESH BEEF OF PRIME QUALITY
GUARANTEED PURE.
A quarter of a teaspoonful dissolved in a cup of boiling water
produces instantly a strong beef tea or bouillon of excellent flavor
Add a little salt, or celery salt
MANUFACTURED BY
URUGUAY BEEF CO.
GENERAL OFFICES
HAMBURG. GERMANY
SOLE AGENTS FOR THE
UNITED STATES OF AMERICA
LEHN & FINK
NEW YORK
MADE IN URUGUAY

Uruguay Beef Extract

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or domestic: Besides possessing all the stimulating and nutritive properties of a high grade Beef Extract, it is sold at a price which allows dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.
Sole Importers.

FORMIN. Hexamethylene-tetramine Merck. Presents this ideal urinary antiseptic in its highest obtainable purity. In powder form, or *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectant. Used the world over. Beware of imitations, which are poisonous and at the same time possess less disinfectant power. See that the signature of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable that the real virtues of cod-liver oil reside in an active principle or principles. Gaduol is the alcoholic extract of the active principles of cod-liver oil. It produces a stimulant and alterative effect on the processes of nutrition and absorption, and does not disturb the appetite or affect the stomach. A wine of cod-liver oil prepared from Gaduol is a favorite tonic and has a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of many babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK.

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY

DR. FREDERICK HOFFMANN.

EDITED BY

DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph.D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M.D., L.L.D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 9.

SEPTEMBER, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

A. PH. A. NUMBER.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial.. 317

Acetic Acid Extracts. By *A. R. L. Dohme*....... 345

The Determination of Codeine in Opium.. By *Charles E. Caspari*...... 348

Pharmaceutical Journals. By *H. P. Hynson*... 353

The Study of Phytochemistry. By *Edward Kremers*....................... 355

Vaccine Season

Now is the time to sell vaccine. Schools are opening, children are being vaccinated. and druggists should make special efforts to secure the business.

For five years Stearns' Vaccine has been on the market. It has always been good: it was never better than it is to-day. It gives the largest percentage of successful vaccinations.

Offered in two forms, both glycerinated: Improved Points and Capillary Tubes. The points are the most convenient of all vaccine points.

Per package of 10 (tubes or points) 60 cents, net.

Order from your jobber, or direct.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,

918-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,

DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

SMOOTH OINTMENTS

easily prepared with

ENDERMOL

(Compound of stear-amide with hydrocarbons.)

Neutral, bland, odorless ointment base.
Holds all drugs in finest subdivision.
The most penetrating of all menstruums.
Not affected by air, never turns rancid.
Renders the skin soft, smooth, velvety.
Furnished anhydrous. Absorbs 15% water.

½-lb. tins, 80c per lb.
1-lb. tins, 75c per lb.

Send for circular.

SCHERING & GLATZ, New York.

There is no time to lose in
DIPHTHERIA
There is no time lost
IF YOU KEEP ON HAND

Pasteur

Antitoxin IN THE DRY FORM

KEEPS INDEFINITELY

NO LIQUID ANTITOXIN IS EFFECTIVE
ONE YEAR AFTER IT IS MADE.

SAVE TIME AND LIFE
BY BUYING THE DRY FORM

"IN TIME OF PEACE PREPARE FOR WAR"

SOLD ONLY BY
SHARP & DOHME
SOLE DEPOSITARIES U.S.A.

TO PROTECT THE DRUGGIST AGAINST ADULTERATION
AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

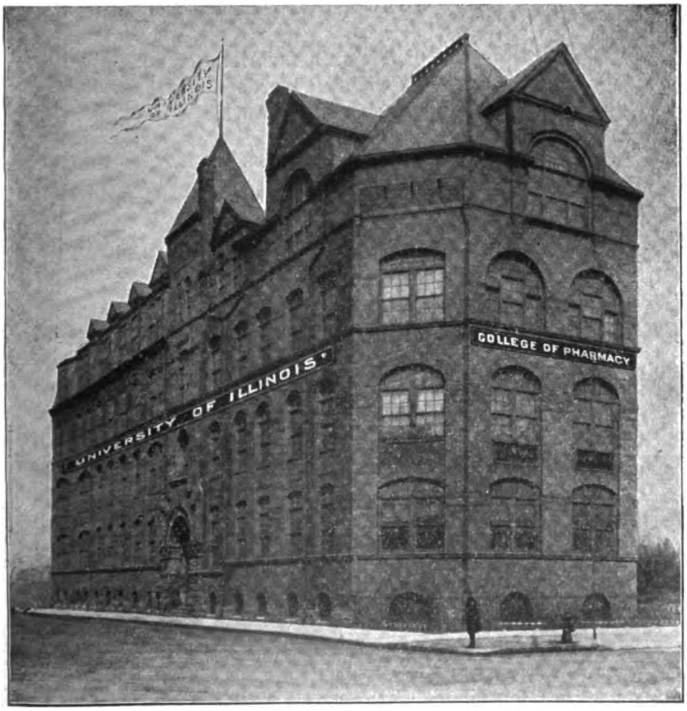
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK

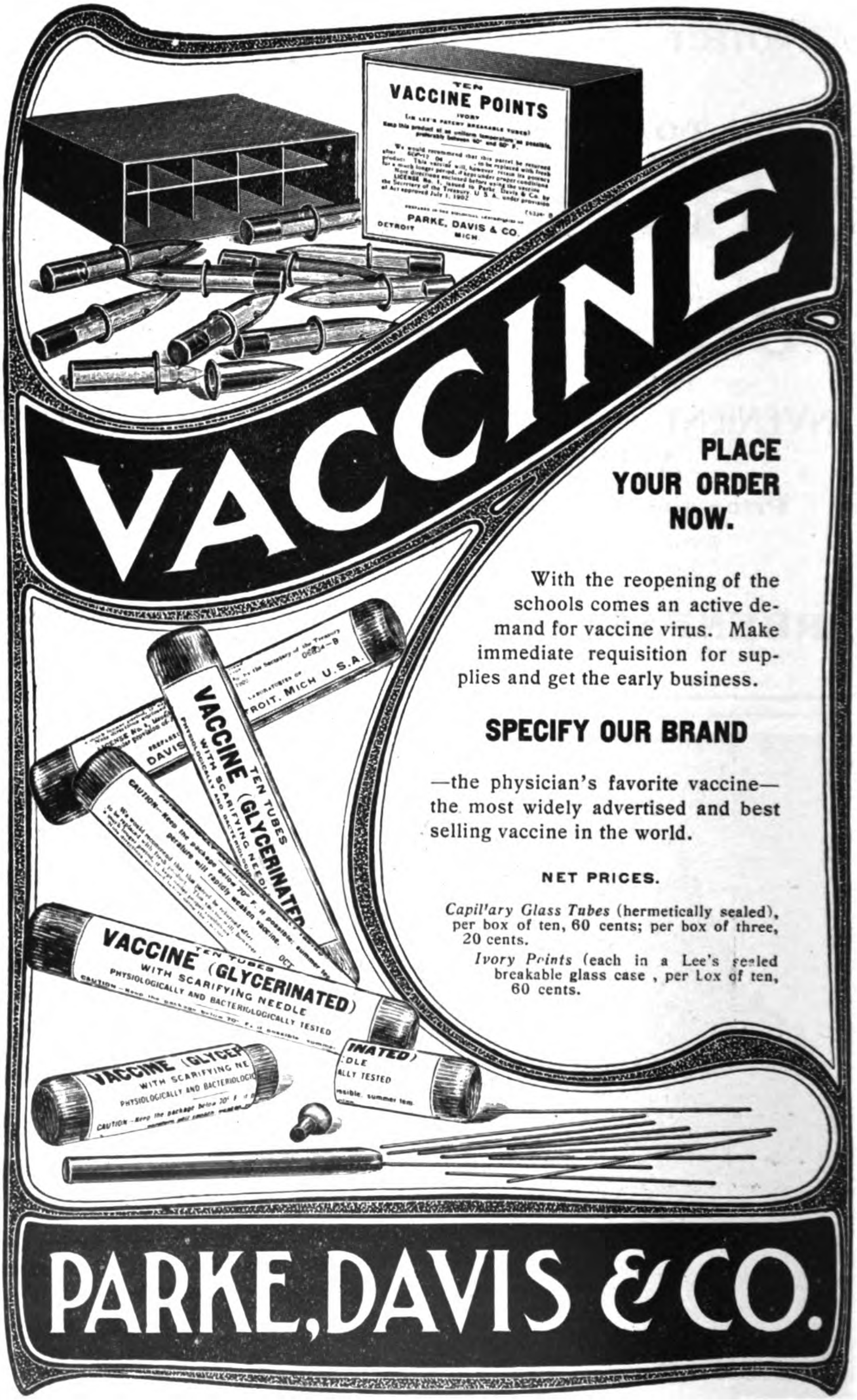


University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.



VACCINE

PLACE YOUR ORDER NOW.

With the reopening of the schools comes an active demand for vaccine virus. Make immediate requisition for supplies and get the early business.

SPECIFY OUR BRAND

—the physician's favorite vaccine—the most widely advertised and best selling vaccine in the world.

NET PRICES.

Capillary Glass Tubes (hermetically sealed), per box of ten, 60 cents; per box of three, 20 cents.

Ivory Points (each in a Lee's sealed breakable glass case , per box of ten, 60 cents.

PARKE, DAVIS & CO.

Pharmaceutical Review.

VOLUME 22. SEPTEMBER, 1904. NUMBER 9.

The Kansas City meeting marks another milestone in the history of the **American Pharmaceutical Association.** The meeting was not a phenomenal one, but it may be placed above the average. It certainly was a successful one in more than one respect. The attendance was fair and the continuous social features so lavishly provided by the local representatives and their ladies, never reduced the attendance upon the sectional meetings to any material extent. There was always a good working force interested in the deliberations.

The membership of the Association was increased to a gratifying extent, though by no means to that point which must be reached to secure a safe financial future to the Association. The success attained is apparently due to the energy with which the committee has taken hold of its work rather than to the offensive system of offering a percentage to those who have secured new members. It will be gratifying to those to whom this method is distasteful to learn that most of the persons who secured new members did not take the twenty percent offered by the Association.

By far greater is the progress made in the presentation of the finances of the Association to its members. The Treasurer's report left no doubt as to the situation. Although there are several thousand dollars in the treasury, as is always the case at the time of the meeting because many members pay their dues in advance, the report pointed out clearly and emphatically that the Association last year spent about a thousand dollars more than it received. The result has been that the members present, realizing for once how the finances stand, put an end to an unnecessary waste in the publication of the Proceedings. Whether the economy to be practiced will suffice to put the Association on a sound financial footing remains to be seen. This much, however, has been gained, namely that the members at large know of the somewhat critical condition, and will not be carried away by momentary impulses in voting away sums, large and small, that are not essential to the successful work of the Association.

ABSTRACT OF A. PH. A. TREASURER'S REPORT,

July 1, 1903, to July 1, 1904.

Receipts.

Cash on hand July 1, 1903	$3,832.03
Received from sale of Certificates	145.00
" " " " Proceedings	29.70
" " " " Badges and Bars	107.20
" " " " National Formulary	247.78
" " Dr. Enno Sander, for Prize	50.00
" " account of Ebert Fund	28 00
" " Com. of Arrangements, Mackinac Island Meeting	40.60
" " Interest on Deposit in New England Trust Co	100.08
" " German Fire Ins. Co., for Mss. destroyed fire	416.67
" " Rebate on Insurance Premium	5.00
" " Annual Dues	6,540.00
" " Life Membership Fees	120.00
	$11,662.06

Expenditures.

Proceedings	$3,274.81
Stenographer	200.00
Journals for Reporter on Progress of Pharmacy	43.66
Semi-Centennial Index	236.85
Salaries	2,800.00
Premium on Treasurer's Bond	12.50
Traveling Expenses	148.55
Section on Practical Pharmacy and Dispensing	25.30
" " Education and Legislation	28.07
" " Commercial Interests	7.94
" " Scientific Papers	22.52
Committee on Membership	93.16
" " Drug Habit	20.00
" " Historical Pharmacy	29.61
" " Finance	20.20
Printing and Stationery	369.77
Insurance	16.88
Badges and Bars	93.45
General Prizes	100.00
Hermann Hager Prize	50.00
John M. Maisch Prize	50.00
Ebert Prize	28.00
George F. Payne, incidental expenses while President	84.95
Insurance Rebate on Mss. found not to have been destroyed	75.00
Miscellaneous Expenses	213.79
Life Membership Fund	120.00
National Formulary	72.39
Cash to new account	3,424.66
	$11,662.06

The Association last year directed the Treasurer ' to add to his customary report such explanatory statements as will not only show whether a cash balance exists or not, but which will present clearly the fact, whether or not the Association's business has been conducted with a profit or a loss, during the fiscal year covered by the report."

The following statements are made in response to this instruction of the Association.

The cash on hand at the end of the fiscal year was $3424.66. Of this amount, $341.67 was money received from the Insurance Company for manuscript of the Semi-Centennial Index destroyed in the Baltimore fire. which money will of course have to be paid out to replace work previously done.

$2795.00 was received for advance dues and properly belongs to the coming fiscal year. $50.00 was money received from Dr. Enno Sander for a prize, which has not yet been awarded.

Deducting these amounts from the cash on hand, there remains a net cash balance of $237.99.

The Association's business, so far as relates to current receipts and expenses, has been conducted. during the fiscal year covered by the report, at a loss of $1044.04.

This is shown by the excess of expenses over receipts when advance payments for dues, at the beginning and end of the year, are equalized.

The expense for the year were $8014.40. The receipts were $7215.36. But the advance payments for dues, at the end of the year were $245.00 more than at the beginning. so that amount should be deducted from the receipts, leaving $6970.36, thus showing the deficit named above $1044.04.

The same deficit is also shown in another way, namely: by the difference in the net cash balances at the beginning and end of the year.

The cash on hand at the beginning of the year was $3832.03. Of this amount $2550.00 was received for advance dues, leaving a net cash balance at the beginning of the year, of $1282.03. The net cash balance at the end of the year, as before stated, was $237.99. The difference is the deficit, $1044.04.

While there has thus been a deficit in the treasury cash, the Procter, Centennial and Ebert Funds have increased in value; the Procter Fund, $557.81; the Centennial Fund, $66.33; the Ebert Fund, $6.38; total increase in the value of the three funds, $630.52.

Therefore, when we consider the treasury cash and also the above named funds, the Association is shown to be $413.52 poorer at the end of the fiscal year, just closed, than it was at the beginning.

The value of the Ebert Fund, June 30, 1904, was $885.60; the Centennial Fund, $1954.98; the Procter Fund, $14,571.83. Total value of the funds, June 30, 1904, $17,412.41.

The above statements give, in direct and simple terms, the facts asked for by the vote of the Association last year.

With the exception of the Commercial Section, all sections appeared to have more work on hand than could be disposed of advantageously in the time allotted. This state of affairs once more emphasizes the necessity of holding sectional meetings simultaneously. With the meetings of the Conference of American Pharmaceutical Faculties, and those of the newly organized National Association of Boards of Pharmacy, which are attended very largely by members of the A. Ph. A. such overlopping of the sessions has already become an absolute necessity. Moreover it works successfully. There is no excuse any longer why e. g. the commercial and scientific sections should not hold their meetings simultaneously.

Another aspect of the situation forced itself upon those members present at Kansas City. A large majority of members present objected to an extension of the time of meeting. A but slightly smaller majority would like to see the time reduced even more than was done at Kansas City. Although the change in the programme did not effect the number of general sessions, the time devoted to general business was insufficient if to be done, according to the present method, by the Association at large and not by representatives delegated with the proper authority. Thus it happened that several hours were wasted on a single recommendation by a committee. Instead of referring the matter back to the committee after an expression of opinion, the Association as such tried to formulate a statement of what it wanted with the result that much time was lost in a parliamentary wrangle, without the satisfaction even now that the matter has been settled.

As a result about a dozen committee reports were rushed through at the last general session when every one was anxious to pack his grip and make a midnight train. Thus e. g. the report of the Committee on National Legislation was read in abstract and from fear that undue time might be consumed in the discussion of this important matter if once begun, not a word was said. Consequently the last general session was particularly successful in so far as the Association got through with its business fully an hour sooner than its officers had expected.

In addition to the problem of simultaneous sessions, the Association is confronted with the problem of organizing sections. By refraining from taking action the Association has by no means solved the problem. Like the question of membership and finance, it will come up again until rightly solved. To some it even appears that these problems, and at least one other matter that has been temporarily smothered, are closely affiliated.

While the several activities of the Association are directed for the most part in a satisfactory manner, its organization is antiquated and some features of the meeting, e. g. that of accredited delegates of associations and colleges has become a farce. The attempts on the part of our Ex-President to present a solution did not meet with a ready response on part of the members present. Perhaps the discussion at Kansas City will assist in clearing up the situation somewhat in the minds of the members. Certainly our new President, Professor J. H. Beal, has a great opportunity before him. That he will not attempt anything revolutionary every one knows. That he may direct development along right lines by pointing these out in his clear and practical way every one expects of him. More than that, we feel confident that in this as in other respects he will not disappoint us. With such problems before the Association, it is well that the next meeting should be held nearer the geographical center of its membership. Whether Atlantic City will prove the proper place for such weighty deliberations remains to be seen.

The existence of the **Commercial Section** was once more threatened. Unfortunately its Chairman was absent because of illness. It was equally unfortunate that he had not written an address in time to be presented by one of his associates. If the officers of a section make no showing of work whatever it is but natural that the members become discouraged.

Of the four papers presented, but one was by a member exclusively a retail druggist. A second paper was written by a member who is a college professor as well as a retail druggist. A third paper was that of a college professor and a fourth by a U. S. government official. In other words, if the college professors and a government official had not shown sufficient interest in the commercial affairs of the retail druggists of this country, this section would have had to be content to discuss the telephone question.

There certainly are other business matters than those pertaining to the prices of fake remedies that merit consideration at the hands of retail druggists. Some of these were indicated in the papers presented, but why do not the pharmaceutical practitioners take the initiative, why wait until "impractical" college professors and government officials bring them to your attention. The excuse given by some that commercial matters do not belong before the A. Ph. A. is all wrong. If that had been made at the time this section was established it might have passed, but now when universities are establishing courses in commerce and thus placing it on an academic level, when retail and wholesale druggists are petitioning colleges of pharmacy to give their studends commercial training, such a plea excuses no one. We are more than thankful to the N. A. R. D. that it has relieved the A. Ph. A. of the "patent" medicine incubus, for it has given us an opportunity to discuss such commercial matters as really belong before the A. Ph. A. Let us demonstrate in the future that we are willing to avail ourselves of this opportunity.

Papers read:

John I. Straw:—Pay telephones or dead head telephones.

James H. Beal:—The deficiency in the supply of assistant pharmacists and the necessity for a longer probationary period.

This paper will be printed in full in the next issue of this journal.

H. P. Hynson:—Department accounts.

Lyman F. Kebler:—Prices and qualities of chemicals.

Historical Section. At the semi-centennial meeting in Philadelphia in 1902, when the members of this Association were in the mood of looking backward as well as forward, a historical committee was appointed. At the Mackinac meeting last year, this committee was given the privileges of a section and a number of papers of an historical character were read that attracted general attention and solicited the interest of almost every one.

As a result of this interest in the past of our calling, this committee was given the permanent organization of a section. The number of papers read was greater than last year and many who have been holding back thus far volunteered to do work. One of the principal objects of the papers presented was to show what kind of work could be done by every one who took but the least interest in pharmacy. If the infection continues to spread at the present rate, this section is bound to be popular with the Association.

This section cannot remain content with the reading of papers. Historic documents of all kind and objects of historic interest should be collected. Already steps have been taken to secure, if possible, space for a pharmaceutical museum at Washington. Valuable contributions have been promised on condition that a safe place, centrally located, be secured. '

In accordance with the recommendation of the President, future exhibits are to be given a more educational character and the Historical Section has been requested to make an exhibit of such a character as soon as thoroughly organized.

The following papers were presented at this meeting:

A. E. **Ebert**: — Procter correspondence.

The author who knew Procter well presented a number of letters with some remarks on the writer of them.

J. F. **Hancock**: — William Procter.

This was practically another plea for a Procter statue to be erected at Washington. The author paid a high tribute to the "father of American pharmacy" who as pioneer did yeoman service for scientific and professional pharmacy in this country.

Fr. **Hoffmann**: — Documents pertaining to the Irving drug law.

A considerable number of documents which are all the more valuable because the pharmaceutical press of the early seventies throws very little light on this bit of legislation which was of more than local importance.*

E. J. **Kennedy**: — Druggists directories.

The speaker presented a complete collection of the Era Druggists' Directory with some remarks on the importance of druggists directories in general to the future pharmaceutical historian.

——Commencement programmes.

As editor of the New York weekly, the speaker has had the opportunity of collecting a large number of programmes which throw some interesting side lights on pharmaceutical education in this country. For this purpose, and not only as a matter of curiosity, they will be of service in the future.

J. W. T. **Knox**: — Historical sketch of the Phi Chi fraternity.

The early history of this organization at Ann Arbor and its more recent expansion, resulting in the establishment of chapters at about half a dozen institutions of learning was briefly outlined. It also throws light on a phase of pharmaceutical education unknown to the older students of pharmacy.

E. **Kremers**: — Drugs of primitive peoples.

An attempt is made to collect information pertaining to what might be called the pharmacy of peoples still in a state of nature, e. g. the North American Indians. The prime object of this preliminary account was to call attention to this subject and thereby to bring out information in the possession of those who have an opportunity to come in personal contact with the red man.†

—— The rites observed in the collection of camphor by the Borneo head hunters.

This paper served to illustrate in a specific case what was outlined in a general way in the previous paper.‡

---

* Comp. the Dec. 1908 and subsequent numbers of this journal.
† Comp. the July and Aug. numbers of this journal.
‡ This paper will be published in a subsequent number of this journal.

—— Pharmaceutical notes from "Cumins tour to the west."

Besides giving bits of information on the condition of pharmacy in the Ohio valley and in Mississippi territory during the early part of the last century, the object of this paper was to show what can be done by using pencil and paper in connection with our general reading.*

J. U. Lloyd: — The founding of the Lloyd Library.

At the request of the chairman of this committee, the author gave an account, such as he alone could give, concerning the most complete pharmaceutical library in this country.*

W. O. Richtmann: — The cultivation of opium poppy in America.

For the first time, there is brought together the information, collected from numerous sources, concerning the cultivation of poppy and the preparation of opium attempted in this country. The paper was accompanied by a series of maps and illustrates how the historical spirit will succeed in making interesting a technical investigation and give to it a broader aspect.

Adelaide Rudolph: — Rice correspondence.

Miss Rudolph has collected letters written by Dr. Rice, also journal clippings pertaining to his life and death and more particularly to the Rice memorial.

S. A. D. Sheppard: — Scrap book of the meeting of 1870.

As Local Secretary, Mr. Sheppard collected everything pertaining to this meeting that could be mounted in a scrap book. Among other things it contains every newspaper and journal account of the meeting, copies of the programmes, list of subscribers, exhibitors etc.

W. Scoville: — Price-list of the Massachusetts College of Pharmacy. 1854.

The speaker pointed out that before the Mass. Coll. Pharm. was a teaching body it discussed commercial matters and tried to regulate prices as evidenced by the copy of the price-list presented. A detailed account will be found in the Alumni Journal of the Mass. Coll. Pharm.

H. M. Whelpley: — Some jubilee correspondence.

As President of the A. Ph. A. during its jubilee year, the speaker collected the letters from prominent foreign representatives of pharmacy to whom invitations had been sent to attend the Philadelphia meeting. The replies were bound in a handsome volume, which is to constitute one of a large number to be devoted to the preservation of mementos of the A. Ph. A.

—— A. Ph. A. pictures.

During his attendance upon a large number of meetings of the A. Ph. A., the speaker has made good use of his camera. A collection of photographs taken has resulted which supplements the printed proceedings in more ways than one.

M. I. Wilbert: — The beginnings of pharmacy in America.

The report consisted of three parts:

1) An account of early drug stores.

2) An account of the first pharmaceutical degrees given, that of Master of Pharmacy bestowed by the University of Pennsylvania upon a number of Philadelphia druggists, an act which seems to have provoked the local druggists to establish the Philadelphia College of Pharmacy.

3) The presentation of a number of lantern slide views of men and places connected with the early pharmacy of Philadelphia.

---

* This paper will be published in one of the subsequent numbers of this journal.

In spite of an attractive social feature, the **Scientific Section** held two successful sessions. The officers in charge of this section deserve the special thanks of the Association for having abstracts of the papers printed with the well arranged programme. This feature commended itself to such an extent that the by-laws were changed making it compulsory upon all section officers to do likewise in the future. The printing of papers in full in advance is a nuisance and no doubt, will be done away with entirely. An abstract indicative of the contents is what the average member wants. This can be demanded prior to the meeting even though the paper be not in final form for presentation.

One of the features of the first meeting consisted in the reading of the chairman's address by title. Inasmuch as he had chosen to write a technical review of the progress in analytical chemistry during the past year, we can only commend his courage not to read it. In its place he presented a report of the officers of the section containing several recommendations. In one of these the desirability was pointed out of having men present, in non-technical form, an address on some scientific subject, pertaining directly or indirectly to pharmacy, to which the membership of the association at large can be invited and in which all will be interested. This is certainly a good suggestion and inasmuch as the section took favorable action on the recommendation, we may expect to see it carried into effect at the next meeting.

The papers, as usual, were of good quality and compare very favorably with those presented at the meetings of corresponding bodies in England, France and Germany. It may be noteworthy that the list of papers included titles by Professor Ernst Schmidt of Marburg, one of our honorary members, and another by H. A. D. Jowett, first assistent to Dr. Power, Director of the Wellcome Research Laboratory of London.

Peapers read:

Chas. E. Caspari:—The determination of codeine in opium.

Until the year 1903 no method was published for the determination of codeine in opium. In that year a method was published by Van der Wielen. and when his paper appeared, the results obtained in this paper were being worked out. The results show that opium contains more codeine than is commonly supposed. See p. 348 of this number.

——— The use of potassium biiodate for standardizing volumetric solutions.

---

* This paper will be printed in the next issue of this journal.

It has been known for some time that potassium biiodate offers an excellent standard for solutions of sodium thiosulphate. This paper does not present anything new, but simply confirms the work done by Meineke, which was published in 1895. Potassium biiodate my be used for standardizing volumetric solutions of sodium thiosulphate, iodine, potassium permanganate silver nitrate and alkalies.

A. R. L. Dohme: — Oleoresin of copaiba.*

A study of the tests by means of which impurities may be detected and the results of the examination of 12 commercial samples, all of which are reported to have been adulterated with resin.

—— Aloes and aloin.

A reply to the papers of Lohmann (N. J. P. A. — Druggist Circular) and to A. Tschirch. Ph. Post 37, p. 265 Points out errors of Lohmann's method of preparation. Criticism of Tschirch's aloin assay, based on the fluorescence of a solution of aloin and borax.

—— Acetic acid extracts.

The complete paper will be found in this issue, p. 345.

—— Fatty oil of mandrake.

Preliminary statement Abt. ½ p. c. oil having the decided odor of a drug. Some of the constants were obtained.

E. H. Gane:—Test for the purity of cod liver oil.

The nitric acid test. Percentage of free fatty acids. Determination of the refractive index. Tests which the pharmacist can apply.

H. M. Gordin:—The alkaloid calycanthine.

After calling attention to the work of previous investigators, the author describes his method of preparation of the alkaloid and the color reactions by means of which it can be identified. Further results are soon to be reported. A brief account of physiological work done by Dr. Cushny is appended.

H. A. D. Jowett:—Chemical examination of cascara bark.

Review and criticism of the work of previous investigators. Results of examination of fresh bark of *Rhamnus purshianus* and *R. Californicus* and of the matured bark of *Rhamnus purshianus.* Composition of the fat. Proof of the presence of emodin and of the absence of chrysophanic acid, chrysarobin and of glucosides. Criticism of the results of Le Prince and of Dohme and Engelhardt. Occurrence of a compound of syringic acid. Repetition of experiments of previous investigators. Physiological experiments with preparations of the bark. Emodin not the active constituent.

Lyman F Kebler:—Chemical reagents.

This paper gives the results of the analyses of many chemical reagents as delivered to the Bureau of Chemistry on contract and special orders. The worthlessness of the description on the label is pointed out. An urgent appeal is made to all chemists to investigate their chemicals and to insist on getting what is ordered. The writer believes that many of the non-concordant results reported by chemists are due in a measure to the use of impure chemical reagents.

——— Co-operative work on opium assaying.

At the last annual meeting of the Accociation of Official Agricultural Chemists a referee on medicinal plants and drugs was appointed chiefly for the purpose of studying collaboratively the various methods of analysis at present used in determining the quality of crude drugs and the products derived therefrom. Circulars were sent out giving the methods to be used in analyzing the sample of opium forwarded to each chemist signifying his intention to assist in the work. The chemists who took part in the work represented the purely scientific, the practical, the expert, the semi-expert, and those engaged in administering the law. The results are submitted here for discussion and suggestions, by way of improvements, to be given either at this meeting or to be sent to the chief of the drug laboratory. The final report will embody as recommendations to the Association of Official Chemists all valuable suggestions as guides for future work.

---

* This paper will be printed in the next issue of this journal.

Lyman F. Kebler:—A preliminary report on the presence of nitrogen and nitrates in medicinal plants.

The interesting observation is reported of what appears to be an exceedingly large amount of nitrogen in solanaceous plants as compared with certain other plants. The economic value of this observation is being investigated. It was also found that part of the American-grown stramonium leaves, so far examined, contained nitrates. American-grown digitalis leaves, so far examined, all contained nitrates, while in the imported leaves the presence of nitrates has not been established.

E. Kremers:—The quinhydrone hypothesis of plant pigmentation.

The object of this investigation is to consider a number of observations from a single point of view, to show how not a few plant pigments may be genetically related, and how by slight changes a variety of shades of the same pigment may be produced.

It can further be shown, that, starting with the same initial substance, one plant may produce largely what is known as volatile oil or part thereof, whereas another plant may produce but little, if any, volatile oil, but be rich in pigment.

Again, it can be shown how by a series of simple chemical reactions, the same plant may produce a volatile oil, so-called, then a pigment, and finally a substance which as such is not classed with either.

With the application of this hypothesis to certain glucosides, the fall coloration of certain plants, and the disappearance of the brilliant fall colors can likewise be explained.

While no attempt is made to explain the evolution of other pigments than those dependent on quinhydrones for their color, a genetic relation between some of them and the quinhydrones can readily be established on paper with the aid of a few reactions very common to plant life.

Moreover, with the aid of this hypothesis, the disappearance of color during the process of experimentation by older and recent investigators finds a plausible explanation and may, therefore, lead to new investigation along rational lines.

A practical application this hypothesis finds in the decoloration of certain colored oils.

Burt E. Nelson:—Notes on the pharmacology of cascara sagrada and bitterless preparations of cascara.

An account of the therapeutic results obtained by administering fractions of the extracted bark, separated by analytical methods, to eight nurses who habitually used the drug, and comparing these results with those obtained from occasional doses of a U. S. P. fluid extract made from the same lot of drug; also of the comparative effects of bitter and bitterless fluid extracts of the same lot of drug upon these same individuals.

The results obtained indicate that a smaller portion of the laxative principles of the drug resides with the tannins, bitter principle and other acidic bodies, and is removed by the ordinary methods used for making bitterless preparations.

W. A. Puckner:—Sodium bicarbonate in iodometric determinations.

The volumetric estimation of phosphites by oxidation with iodine in presence of sodium bicarbonote failed because of a loss of iodine, caused by the sodium bicarbonate. This loss, caused by the hydrolysis of the bicarbonate, is proportional to the mass of sodium bicarbonate, the time of interaction, the concentration of the solution, the temperature and the size of the flask in which the reaction occurs. It may be prevented by working in dilute solutions which have been saturated with carbon dioxide.

J. P. Remington, Jr.:—Cod liver oil (the fresh, natural product).

Cod liver oil, universally recognized as an alterative nutrient. Physiological effects better produced by the naturnal oil than by extractives. Great difference in taste between a clean fresh oil and a decomposed oil. Causes of superiority of Norwegian oil. Best methods of collection and preservation. Cod liver oil should be tested by pharmacists, if possible, in order to insure purity.

Ernst Schmidt: — The relation between chemical constitution and physiological action of certain organic bases.

Albert Schneider:—The introduced and native medicinal and poisonous plants of California.

This is the first attempt to classify or arrange the medicinal plants of California. In the introductory part attention is called to the climatic conditions of the state; the peculiarities of the native fauna and flora, and the nature of the introduced plants. Attention is called to the California commerce in crude vegetable drugs, from which it appears that most drugs are imported, even though they may be very abundant and near at hand. This is primarly due to the high priced labor of the United States, making it impossible to compete with foreign cheap labor. Thus the cultivation of the poppy and camphor tree had to be abandoned, in spite of the fact that the climatic conditions are very favorable.

This general introductory matter is followed by an alphabetical list of the more common medicinal plants found within the state. After the scientific name, common name and natural order of each plant, is given a brief mention of its use, especially by Indians, missionaries and settlers. Many of the plants cited require further study; this applies particularly to the great variety of plants which are generally designated as poisonous.

Some of the more important literature on the subject is cited. Attention is called to the extensive though widely scattered and often fragmentary literature treating of the cultivation, distribution, chemistry, physiological action, etc., of medicinal plants, and the importance of such literature to those who desire to make a study of pharmaceutical botany. California with its wide latitudinal and altitudinal range is peculiarly adapted to the cultivation of a great variety of medicinal as well as other economic plants. This is evidenced by the fact that the Department of Agriculture is about to establish an experimental seed growing station at Chico, California. In addition there is now in operation a Garden of Medicinal Plants in Golden Gate Park, San Francisco.

In all about 600 California medicinal plants are mentioned, which list is, however, far from complete and does not include a large number which may be introduced into the state. Plants from Australia, Southern Europe, Mexico and the Philippines are rapidly being introduced.

L. M. Tolman:—Notes on the methods of detection of adulteration in olive oil.

The author considers the most useful tests at present available for detecting such adulterants of olive oil as oil of sesame, peanut oil and cotton seed oil. It is pointed out that certain impurities contained in some oils give a color reaction closely resembling the sesame oil reaction in the absence of the latter oil. A method for removing the impurity is given. The halphen test has practically superceded all other tests for detecting the presence of cotton seed oil. Oil of kappok, an oil closely related to cotton seed oil, apparently is the only oil interfering. The method used for detecting the presence of peanut oil is given in detail.

M. I. Wilbert—Epsom salts.

Magnesium sulphate, a well-known and extensively used chemical. Chemically, comparatively pure. Mechanical admixture or foreign materials an objectional feature common to all heavy chemicals. Commercial variety of magnesium sulphate frequently sold for medicinal use. Ready methods of detecting usual impurities. Wide spread use of magnesium sulphate. Official titles. Synonyms. Origin. Early manufactures. Present source. Importations of magnesite and magnesium sulphate. Use in the arts and manufactures.

Everyone who desires to see the A. Ph. A. keep up its interest in educational matters will welcome the revival of educational papers before the **Section on Education and Legislation.** While last year we took special pleasure in pointing to the excellent report by the Secretary of this section, this year we take equal pleasure in commending to sectional chairmen the admirable resumé of last year's educational and legislative activities contained in the address of the chairman. Inasmuch as it is of special importance in this section that the chairman be elected, not only with reference to his capacity as presiding officer, but also for his ability as a reviewer of the field covered by the section, we congratulate the section upon the reelection of its last year's chairman.

As already pointed out, this year witnessed a revival of interest in matters educational. The Conference of Pharmaceutical Faculties can never replace the Educational Section. Whereas the former must of necessity be a restricted body, the floor of the Educational Section should always to be open to all. Moreover, let us hope that the time may never come, when the very important subject of education will be of interest to the college professor only. Whereas technical matters in education had better be thrashed out by instructors, the interest manifested in the papers read clearly showed that the pharmaceutical practitioner and professor have many interests in common and that it is better for both parties to come into touch with each other occasionally than to stear clear of each other all year round.

In place of further comment we, herewith, quote a paragraph from the chairman's address:

"For two or three reasons the year has been an eventful one in pharmacy. It has done nothing less, indeed, than to usher in a new era in the evolutionary development of the profession. Over thirty years ago a movement was initiated which, consciously or unconsciously to its supporters, looked towards the enactment of a pharmacy law in every state and territory in the Union—a law making it necessary for druggists to undergo state board examinations, and surrounding the vocation with other necessary and proper restrictions. This movement has been brought to its culmination during the past year by the action of Congress in enacting a law for Indian Territory, the last commonwealth to be provided with a statute. The first stage in the legislative process has thus been passed; but we have more reason to congratulate ourselves over the fact that the second stage has been entered upon without delay. New York has this year placed an act upon her statute book which insists that every man who desires to practice the art of the apothecary must not only pass the State Board examination, but must also be graduated from a reputable school or college of pharmacy. The year has thus witnessed the closing of one era and the opening of another; and it is no idle statement that the date 1904 will be looked back upon with great interest in the years to come, when the historic sense and the pride of profession shall have reached a fuller and more satisfactory development in pharmacy."

Papers presented:

J. H. Beal:—The requirement of graduation from a high school before admission to colleges of pharmacy, and of graduation from a college of pharmacy before registration as pharmacist.

The author emphasized the necessity of securing the passage of a "prerequisite clause" in many if not all states before material progress can be made in pharmaceutical education. He pointed out that the advance in medical education would have been impossible had the different states not demanded graduation from a reputable medical college as a prerequisite to registration as medical practitioner.

R. G. Eccles:—Food legislation as affecting pharmacy.

Henry P. Hynson:—Pharmaceutical legislation, with special reference to anti-narcotic laws.

—— A commercial course in colleges of pharmacy.

Edward Kremers:—The study of phytochemistry.

This paper will appear in full in this journal in the near future.

Caswell A. Mayo:—The prerequisite law in New York state.

An account of the legislation commonly known as the prerequisite law, i. e. the clause in the New York law which demands graduation from a respectable college of pharmacy as a prerequisite to examination by the N. Y. Board of Pharmacy.

J. T. McGill:—What degrees should be conferred by schools of pharmacy?

"The main points in this paper are: Some schools confer degrees for an amount of work too small to deserve a degree. There are too many different degrees conferred by schools of pharmacy. There is a tendency to confer the bachelor's, master's and doctor's degree upon men who have not had an academic training sufficient for a baccalaureate degree. This tendency should be checked. While the conference of college faculties is seeking to secure uniformity in entrance requirements and courses of study, it should also endeavor to agree upon the degrees to be conferred and make the requirements for them uniform.

C. F. Nixon:—The history of the Massachusetts law giving the board of pharmacy supervision over druggists' liquor licenses.

> "How has this law worked in practice, and has it been a benefit to true pharmacy in the state? As already stated, there were in 1894 over 1800 drugstores in the state; to-day, ten years later, notwithstanding the great increase in population, there are but 1580. The number of stores closed by the action of the board in the first year of the operation of the law was 108. The total number closed to October 1, 1903, after nine years of the law, was 422.
>
> | | |
> |---|---|
> | Number of complaints investigated to October 1, 1903 | 1028 |
> | Number of prosecutions | 455 |
> | Number of convictions | 397 |
> | Number of "certificates of registration" revoked | 28 |
> | Number of certificates suspended | 101 |
> | Number of revoked certificates restored | 6 |
> | Number of suspended certificates restored | 2 |
> | Number of "certificates of fitness" refused | 1819 |
>
> "I do not believe, however, in the sixth-class license of this state. It may be right in principle but is wrong in practice, and puts a premium on dishonesty. I believe that the greatest boon for legitimate pharmacy would be to eliminate the liquor business entirely from drug stores except in the compounding of medicines, and I further believe that this condition will exist in Massachusetts in the near future."

W. R. Ogier:—Interstate registration: is it practicable?

> "Some good things have been said in favor of reciprocity in the registration of pharmacists. When considered simply as a theory the arguments advanced in favor of the proposition are not easily controverted. But the difficulties in the way of putting it into effective and equitable operation are so numerous that small promise is given for its speedy accomplishment. A few of these are suggested:
>
> "1. State laws relating to pharmacy differ in essential particulars, many of them radically.
>
> "2. There is reason to believe that the opinions of members of boards of pharmacy, in so far as they have been formed at all, have not crystallised toward a uniform agreement for reciprocal registration.
>
> "3. Boards of pharmacy change their personnel so frequently as to preclude any settled policy on important questions.
>
> "4. Under the imperfect, not to say vicious, system by which some boards of pharmacy are created and perpetuated, it is not to be expected that the best qualified men for this important position are to be obtained with the result that the sort of examinations prepared by what are regarded as our best boards are far from ideal.
>
> "5. If, by extraordinary effort, a superior board is obtained for any state, its labor in securing for the citizens of such state a class of pharmacists of more than average qualifications may be largely nullified when men registered in other states with a lower standard are admitted on certificates, and this objection will not be obviated by uniformity in legislation.
>
> "6. There is some room for belief that the methods of some boards in passing candidates for examination are not always above suspicion.
>
> "7. With all our assertions of national unity, the United States is but a federation of many sovereignties.
>
> "8. The best pharmacists are not nomads, and the agitation for reciprocal registration does not emanate from this class.
>
> "9. It is not a difficult matter for a well qualified pharmacist of good

standing in any state, when finding it necessary to remove to another state, to demonstrate his competency to the members of any board of pharmacy competent to discharge its duties, without undergoing a severe ordeal; and all others should be required to pass a rigid examination.

"10. Prolonged discussion of the policy of reciprocity in certificates to teach in the public schools has not developed any satisfactory plan by which a school teacher licensed in one state may be given like privileges in another state without examination.

"11. No evidence of moral character is required by any state law or any board of pharmacy, so far as this writer is aware, and there is growing complaint from pharmacists of the incompetence of clerks through intemperate habits.

"The first step towards reciprocal registration should be taken in a spontaneous effort towards uniformity in pharmacy laws by displacing in each state existing acts with those similar to the model pharmacy law approved by the American Pharmaceutical Association in 1900."

W. A. **Puckner**:—The consideration of alkaloids in schools of pharmacy.

"In the following I beg leave to discuss 1) the desirability of discarding the division of alkaloids into amines and amides; 2) the advantage of bringing out more clearly the similarity of the properties of ammonia and the alkaloids, and to advocate the elimination of statements to the effect that alkaloids unite with acids without the elimination of water, and 3) the advantage of bringing out more prominently when treating of the precipitants for alkaloids, the relation of alkaloids to the alkali metals in their chemical properties. And, finally, I desire to propose a more rational plan of naming alkaloids and their salts."

T. N. **Phillips**:—Historical sketch of the establishment and organization of the U. S. Naval Hospital Corps.

H. H. **Rusby**:—The consolidation of the New York College of Pharmacy with Columbia University.

"In New York City and vicinity there are nearly 8,000 pharmacies which will come under the influence of the new law, and throughout the State there are probably nearly as many more. The closing of these pharmacies against the graduates of schools which do not attain to the standards now set, and those hereafter to be instituted, will constitute the strongest kind of a stimulus to schools elsewhere. Furthermore, such an illustrious example, in one of the most important states, of an action that at once commends itself to all right-thinking persons cannot fail to be imitated, until the entire system of pharmaceutical education in this country shall be in vigorous movement toward a higher plane. Whatever assistance the movement in New York State has received, or shall hereafter receive, as a result of the consolidation of the New York College of Pharmacy with Columbia University constitutes the significance of that consolidation to pharmaceutical education in this country."

Albert **Schneider**:—The advantages of higher and uniform entrance requirements to colleges of pharmacy.

Wilbur L. **Scoville**:—Teaching versus learning.

"One student has the 'practical' idea, which in these days means an appreciation of finances. His interest in botany, chemistry and physics depends upon the extent to which he can see that "there's money in it." And he may be made to interest himself in them from that standpoint to his own good, and that of the people as well. But is he well taught unless some effort is made to show him that culture has a value of its own not expressed in dollars and cents, and that an education may be valued for its power of making friends, and the increased capacity for enjoyment which it brings

> into life? And won't he accomplish more in the future if he gets this idea mixed with the other? Another student has the intellectual idea, and values knowledge for its own sake. He doesn't need to force an interest in the sciences, for he finds real enjoyment in study, and he dreams of the time when he too may contribute to human knowledge. But isn't it well for him to be taught that knowledge of itself is one of the cheapest things in the world? and that it finds its highest value in its usefulness to people who may appreciate not it but its results?"

M. I. Wilbert:—The pharmacist and the physician.

> "How woefully deficient and unsatisfactory the drug service in many of our hospitals must be, becomes evident when we realize that in this great country, with hundreds of institutions to supply them, we have had but one solitary instance of a hospital pharmacist who has become widely known through his professional and scientific work. I refer to the late Charles Rice, of Bellevue Hospital, New York, who, I am sorry to add, was himself a foreigner by birth and early training.
>
> "If the hospital pharmacist of to-day, or the professional pharmacist of to-morrow, is to have and to hold the confidence of medical practitioners, he must be at least the equal of the medical man in education, in ideas and in ideals. He must be a well educated, thoroughly scientific and altogether capable man, well versed in all the branches of knowled.e connected with his own profession, and gifted with a breadth of view that will readily place him above the average of his fellow-men."

The **Section on Practical Pharmacy and Dispensing** showed its youthful vigor and vitality. For a moment there appeared the possibility of attaching to it the older sister, the Commercial Section. Fortunately for both this danger was averted. There is no more reason why the two should be united in the A. Ph. A. than that the subjects to which they are devoted should be given together in the college of pharmacy.

The Section on Practical Pharmacy and Dispensing was created in order to emphasize the art of pharmacy as distinguished from the sciences underlying this art, e. g. chemistry, botany, pharmacognosy etc. While personally we may regard the desire of some to exclude the college professor as foolish, every one will agree that it is desirable to have a section which is primarily the realm of the pharmaceutical practitioner. Here he should feel perfectly at liberty to present even one minute papers if their contents convey something new. Suggestive and helpful hints from experience have a place in this section. From its inception its sessions have partaken, at least in part, of the nature of experience meetings. This feature should not only be permitted but fostered so long as it brings life into members who would otherwise take little or no part in the professional deliberations of the Association.

Furthermore, this is the section where the report of the Committee on the "National Formulary" has received the congenial reception which it deserves.

The principal discussion which this report evoked at Kansas City was on the question of abbreviated names for the preparations of the "National Formulary" in order to induce physicians to prescribe them. For one the writer can not understand why the abbreviation which is demanded for chemical substances and which is already tolerated for mixtures in the U. S. Pharmacopœia should be unethical when applied to the "National Formulary". Why the "practical" pharmacist should be so impractical, even after the success of the change is pointed out to him in specific instances, some of us fail to comprehend.

Possibly of more immediate importance is the action taken by the Association demanding "adequate" compensation for the use of the "National Formulary" by authors and publishers, some of whom in past years are reported as having adopted the book as their own without even asking permission. Let us hope that the income from this source may be such that the Committee on the "National Formulary" may be placed on a basis that will enable it to remunerate those who have been willing to sacrifice their time and energy for those who have been harvesting where they have not sown.

E. Brunor:—Improved process for solution of magnesium citrate.

The improvement suggessed consists in preparing a concentrated solution of magnesium citrate, adding the simple syrup and filling the bottles with carbonated water. The following formula has given the best satisfaction:

Magnesium carbonate	15 Gm.
Citric acid	27 Gm.
Oil ol lemon	1 gtt.
Simple syrup	60 Cc.
Hot water, q. s.	90 Cc.
Carbonated water	360 Cc.

Dissolve the citric acid and magnesium carbonate in enough hot water to make 90 cc.; the oil of lemon is dropped on the magnesium carbonate before it is added to the citric acid solution, and when the reaction is completed, filter.

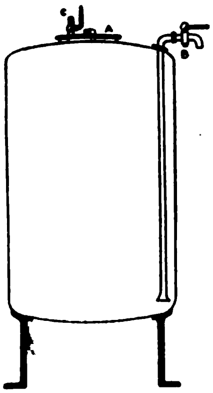
This concentrated solution of citrate of magnesia will keep for a month or more if it is kept on ice and in completely-filled sterile bottles.

To make a bottle of solution use 90 cc. of the concentrate, add 60 cc. simple syrup, then add a sufficient quantity of carbonated water, or so-called soda water, to make 360 cc.

W. A. Dawson:—Some commercial aspects of infusion of digitalis.

——— Storing away knowledge.

F. E. Fiske:—Pilular versus powdered extracts.



E. H. **Gane**:—A container for fluids which spoil on exposure to air.

W. T. **Jackman**:—Laboratory notes.

W. C. **Kirchgessner**:—Elixir of carica-papaya.

Trade names: Papain, papoid, cariod, caripeptic, carapay, digeistos, papayadon. The juice in its natural state is neutral or slightly alkaline. Experiments were conducted so as to obtain the juice in a palatable and as near a natural solution as possible, with the result of the following formula:

Liq. potassa, U. S. P.	5.5	Cc.
Alcohol	120	Cc.
Syr. simpl.	120	Cc.
Papain	17.0	Cc.
Spt. Aur. co.	6	Cc.
Water	240	Cc.

1. Mix the alcohol, spirit and syrup.
2. Dissolve the juice in the water, hot (not boiling), to which the potassa solution has been added. When cool mix with other solution."

——— Glycerole acidi hydriodici.

"The advantages of a glycerole over a syrupy base where an acid is in solution, are as follows: 1. It is permanent; 2. It will not caramelize; 3. It will not ferment; 4. It will not crystallize when cold; 5. It is a better preservative; 6. No heat or evaporation is necessary; 7. It is harmless when taken in doses as a medicinal syrup; 8. Heat, cold or light do not affect it.

The following formula will make a 2 per cent. glycerole:

Potassium iodide	208.0 or 4000 grs.
Potassium hypophosphite	16.0 or 304 grs.
Tartaric acid	192.0 or 3696 grs.
Water	240 Cc. or 10 fl. ozs.
Dil. alcohol,	
Glycerine, 50 per cent., q. s.	

Dissolve the potassium salts in the water. Dissolve the acid in 400 cc. or one pint diluted alcohol. Mix the two solutions and pack in ice for three hours, shaking bottle occasionally. Filter. Of the filtrate, 2 fluid ounces added to 14 fluid ounces 50 per cent. glycerine will make a 2 per cent. glycerole. One fluid ounce to 15 fluid ounces of 50 per cent. glycerine will make a 1 per cent. glycerole, and the filtrate itself will be a 16 per cent. solution, and can be kept as such so as to make any strength the physician may desire up to 16 per cent. The amounts given in the formula will make 11 pints of a 2 per cent. glycerole."

——— Pulvis ventriculus callosus gallinaceus.

"Are very easily obtained, but not so easily powdered. As soon as the chicken is killed the gizzard is removed, cut open, and the lining peeled off, washed and dried. In a warm place it will dry thoroughly in one hour, when it is ready to powder. Most any butcher will do this for you by paying him $2 to $3 per pound., It is said to be superior to pepsin, and is indicated in indigestion and vomiting in pregnancy."

——— Developing a prescription business.

"Why is there a cry from so many pharmacists that there is a decline in their prescription business, and some state they have none at all? Who is to blame for such a state of affairs? The pharmacists or physicians? My answer: both, and the remedy: a better understanding with each other."

——— Elixir of the glycerophosphate of lime and soda.

"The difficulty in making this elixir is to keep the calcium glycerophosphate in solution. Experiments were made by using citric acid, combinations of citric acid and potassium citrate, citric acid and phosphoric acid, and acid phosphoric 85 per cent. and hydrochloric acid. The menstruums employed were sherry wine in different proportions with alcohol, simple elixir and prune juice. I find the one that will stay in solution and keep and make a palatable elixir is as follows:

Sodium glycerophosphate	128 gr.
Calcium glycerophosphate	64 gr.
Hydrochloric acid	1 fl. dr.
Simple syrup	4 fl. ozs.
Spts. auranti co	1 fl. dr.
Prune juice, q. s. for fluid pint.	

Dissolve the sodium and calcium glycerophosphate in the prune with the hydrochloric acid previously added. Mix the syrup and spts. orange. Filter if necessary."

M. Noll:—Keeping a record of filled prescriptions.

E. A. Ruddiman:—Some dispensing notes.

Suggestions with reference to saccharin, quinine salts etc. that cannot be abstracted.

W. L. Scoville:—Wax in suppositories.

"From these experiments I draw the following conclusions:

1. Suppositories containing as much as 25 percent, at least, of chloral can be made with cacao butter only as a vehicle by either the hot or cold process. When made by the hot process the molds must be chilled in a mixture of ice and salt to admit of prompt dispensing.

2. Spermaceti can be used in equal proportions with chloral, phenols or volatile oils, and the suppositories can be depended upon to melt at the temperature of the body. With chloral and phenol, one-quarter to one-half as much spermaceti as of the chloral or phenol used is sufficient to admit of prompt and safe dispensing. With volatile oils an equal weight of spermaceti may be used safely.

3. White wax raises the melting-points of softer fats and oils much more than does an equal quantity of spermaceti. If used at all, it must be employed only in small proportions (less than 10 per cent. in all cases) and with caution. It sets more slowly than spermaceti, and thus is of no advantage over that body for prompt dispensing.

4. In all cases were wax is needed in suppositories, spermaceti is to be preferred, and in moderate amounts is safe."

M. I. Wilbert:—An adjustable label drawer.

Two illustrations accompany the description that cannot well be abstracted.

——— A new prescription file.

Also an illustrated description that cannot be abstracted.

——— Some green preparations and how to make them.

"An economical source of chlorophyl, and one that does not appear to be generally known or appreciated, is hemp-seed. The seed-coat and outer hull of this seed contain a considerable amount of the green coloring matter that appears to be present in a fixed and more or less permanent quantity, and may be readily extracted with a suitable menstruum. In this connection it may be said that a sample of hemp-seed that was known to be at least six years old still gave a very satisfactory dark-green tincture with stronger alcohol.

If twenty-five parts of powdered or ground hemp-seed are macerated for a short time with an equal amount of stronger alcohol, then transferred to a percolator and extracted with the same menstruum until one hundred parts of the percolate have been obtained, they will yield a tincture that has an intensely deep-green color, and may be used as a basis for coloring alcohols, essential oils, alcoholic liquids, spirits and soap solutions."

* * *

In matters of great import it is often wrong to judge by immediate results. Quiet preliminary work extending over years is often necessary to make outward results possible. The patience necessary to do this quiet work, which is more frequently critisized than applauded, deserves special commendation; yet everyone affected will welcome the outward results of the meeting of the **Conference of Pharmaceutical Faculties.**

Below is given a list of the requirements for eligibility to membership in the Conference. These requirements are humiliatingly low and attempts were not wanting to make them appear higher without adding anything of educational value to them. To the praise of the pharmaceutical educators in this country it must, however, be stated that the sense of honor and honesty was greater among the delegates than the humiliation felt at the low standard proposed to be maintained.

Never before has the cause of pharmaceutical education in this country been helped along more than by the confession that the small amount of instruction demanded for membership in the Conference is the maximum that can at present be demanded by an organization which boasts that only the better institutions of this country are admitted to its membership.

Thank heavens, the facts are out. At last we have found the actual foundation of our much boasted structure of pharmaceutical education. Now that we have admitted to ourselves how we stand we can proceed rationally and with new courage. The outlook for pharmaceutical education has never been brighter than now that this confession has been made in specific terms in place of self-laudation and aggrandizement. We cannot afford to remain on this basis. We must work onward and upward. The start in the right direction has at last been made.

Qualifications for Admission to and Membership in the American Conference of Pharmaceutical Faculties.

1. The institution shall be incorporated as a college or school of pharmacy, or be a department of a regularly incorporated educational institu-

tion, or a department of a state university, or conducted by an incorporated pharmaceutical society.

2. The school or college shall have been in continuous operation in America for at least five years prior to the date of application for membership in the conference.

3. The institution shall include in its courses of instruction oral lectures, personal laboratory work, recitations and reviews. Work in absentia is excluded.

4. The institution shall require of each candidate for graduation not less than five hundred hours given to lectures and recitations, and not less than six hundred hours of laboratory work; such work to be given in a period of not less than forty weeks.

5. The requirements for admission of students to the school or college shall be: 1) a minimum age of 17 years, unless the candidate is a high school graduate or possesses an equivalent education; 2) graduation from a grammar school or its equivalent.

6. If the information furnished by the applicant be regarded as sufficient to warrant, the chairman of the Executive Committee shall appoint a committee of visitation, consisting of three representatives of the conference, who shall visit such institution, shall inspect the equipment and method of instruction, and report their findings to the chairman of the executive committee.

Fortunately, the A. Ph. A has given its support to this onward movement by urging upon its members to secure wherever possible the adoption of a prerequisite clause to our state laws. Without the passage of such legislation the progress of the Conference would of necessity be exceedingly slow. The Conference may point out the necessity of the prerequisite clause, but the druggists of this country will have to demand its enactment into law.

Again it is fortunate that the Boards of Pharmacy have come together. Their cooperation, not only among themselves, but with the A. Ph. A. and with the Conference is necessary to bring about the progress that is desired. If we have entered upon a new era in legislation as the Chairmain of the Section on Education and Legislation of the A. Ph. A. pointed out, let it be emphasized that this new era is based on pharmaceutical education. In ignoring the education of the prospective pharmacists, the several state laws made an enormous blunder. Largely because of this the state laws have been of so little benefit to the pharmacist himself. If in the new era we are now presumably entering upon, this mistake be corrected, much will have been accomplished.

* * *

Persuant to an invitation by the A. Ph. A. the state boards of pharmacy of the United States and of Canada sent representatives to Kansas City. At the first meeting there are reported to have been as many opinions as there were persons present. Under such conditions united action scarcely seemed possible but the **Association of American Boards of Pharmacy** has been successfully launched and we wish her God's speed.

If for the next few years this new association were to do nothing more than to bring all or mostly all boards of pharmacy together it will have accomplished much. That all of the members present feel the importance of coming together was clearly shown by the numerous and protracted meetings held.

While it seems unnecessary to report any of the individual opinions expressed at these gatherings, it is of importance that the pharmacists of this country should know on what basis this Association is going to work.

Constitution and By-Laws

of the

National Association of Boards of Pharmacy.

ARTICLE I.

NAME.

The name of this association shall be THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

ARTICLE II.

OBJECTS.

The purpose of this association is to provide for interstate reciprocity in pharmaceutic licensure, based upon uniform minimum standard of pharmaceutic education and uniform legislation.

ARTICLE III.

MEMBERSHIP.

The members of this association shall be officers and members of any state or territorial board of examiners in pharmacy whose board of pharmacy shall have formally adopted this constitution, by-laws, rules and regulations, and shall have certified to this association such adoption under official seal: Provided, that each state represented in this association shall have but one vote, but all members in attandance may participate in the discussions upon any subject considered by this association.

ARTICLE IV.

OFFICERS AND THEIR DUTIES.

Section 1. The officers of this association shall be a president, three vice presidents, and a secretary-treasurer, elected annually, whose duties shall be those usually pertaining to these offices. There shall be an executive committee of five, consisting of the president and the secretary-treasurer, ex-officio, and three members elected by the association. The term of office of the members of the Executive Committee, other than president and secretary-treasurer, shall be three years, provided that, of the first executive committee elected, one member shall be elected for three years, one for two years, and one for one year.

Section 2. The Executive Committee shall have charge of all the affairs of this association in securing the objects for which it is organized. Their action shall be subject to the approval of the association at its annual meeting.

ARTICLE V.

MEETINGS.

This association shall meet annually during the sessions of the American Pharmaceutical Association.

ARTICLE VI.

INTERCHANGE OF CERTIFICATES.

The interchange of certificates provided for by this constitution, shall go into effect whenever ten states or territories shall have made application for membership.

ARTICLE VII.

AMENDMENTS.

Amendments to this constitution shall be presented in writing at an annual meeting, and, for adoption, require a two-thirds vote representing a majority of the constituent boards.

By-Laws.

ARTICLE I. Any state or territorial board of examiners in pharmacy desiring membership in this association, shall apply to the secretary in writing, furnishing with its application a certified copy of the record of such board, showing that they have adopted this constitution, by-laws and rules and regulations, accompanied by a fee of ten dollars, which shall be the annual assessment.

ARTICLE II. Upon receipt of an application for registration upon examination in another state, the secretary of the board shall request the secretary of such examining board to furnish a certified copy of the applicant's examination questions and ratings: Provided, that in all cases the applicant shall have received a rating of five per cent higher than the minimum rate required by the board before which he was examined; and said questions must be satisfactory to the board from which he seeks registration.

ARTICLE III. It shall be the duty of the Executive Committee to prepare blank applications and other necessary papers, and cause them to be furnished by the secretary to the several boards of pharmacy.

ARTICLE IV. For the conduct of business at the annual meetings of this association, a representation of one-third of constituent boards shall constitute a quorum.

ARTICLE V. Amendments to these by-laws shall be presented in writing, and for adoption require a majority vote of states represented at any annual meeting.

* * *

"The richest and most universal benefits to be expected from a great exposition — its educational and moral benefits — can not be measured in terms of dollars and cents." If this be the principle by which the President of the **Louisiana Purchase Exposition** and his coworkers have been guided, those of us who have been invited by the exposition authorities to come, to see and then to write, certainly ought not to judge the event from a lower plane than that on which its builders stand. Seen from the educational and moral point of view, the size of the grounds and buildings, the number of exhibits and the cost of it all are but secondary matters. However, they enter in so far as they influence the educational value either directly or indirectly.

An American writer in a German magazine after giving a general account of the exposition, in which its shortcomings were not forgotten, stated at the close of the article: "But when at night the court of honor is radiant with its tens of thousands of electric lamps, all criticism ceases, nothing but praise remains."

Another American, who for some years has been accustomed to English ways is reported to have said that while he was somewhat disappointed at his first visit, the Exposition had gradually grown on him.

While some of us who have intentionally approached the grounds on foot experienced a slight feeling of disgust at the unfinished appearance, and even disorder and filth on one of the main approaches to the grounds, the large majority of visitors does not see these things. If all visitors could be compelled to approach the grounds on foot or in open vehicle through Forest Hill Park it would be better still.

In like manner but few have their aesthetic sense outraged by the manner in which commercialism imposes itself lowdly upon the public not on only "The Pike" but in the very atmosphere of classicity of the magnificent court of honor.

The large majority of American people take these things as they take the newspaper accounts about the Chicago professor, one of which I read before breakfast this morning in the Sunday edition of a St. Louis paper. A large educational institution supported by watered oil stock must resort to business methods in harmony with those of the commercial institution that made its existence possible. Such at least is the sense of fitness of public opinion.

Like all other things human, education is relative, and the masses of people who enter the grounds are elevated when gradually the splendor of the court is revealed to them, no matter what the approach. That they should have to run a gauntlet of megaphones is to them as much in keeping here as are the war cries of thousands of young men and women of rival universities receiving their education on the foot-ball field.

The readers of a scientific pharmaceutical journal do not expect to be told about the general features of the Exposition. Such accounts have been plentiful in the general press and in popular magazines. To give a detailed account even of the pharmaceutical aspects of the exposition is out of the question, if such an account is to be something more than a mere catalogue of exhibits.

In as much as the principal intent of the Exposition is to be educational, it is but right that we should judge it from its own point of view. What, therefore, may the pharmacist learn from a visit to the Louisiana Purchase Exposition?

Many a hard working pharmacist who comes to St. Louis leaves his apothecary shop with the express purpose of getting away from pharmacy for a week or a fortnight. He will not ponder over the exhibit of the Wellcome Research Laboratory and remark "That is what I am especially interested in" as did the young disciple of our art the other day who evidently had not come to the grounds in order to get away from his profession. Neither does it fall within our domain to dwell upon the educational value of the splendid architectural effect of the central group of buildings, its statuary and display of light and water. These benefits the pharmacist will enjoy as a member of human society at large. Here we have to deal with him in his professional capacity.

The fact that this Exposition is the "biggest" ever planned and carried to a successful completion has been advertised all over the world and the "Official Guide" tells you all about size and cost. No doubt, this has drawn thousands and is drawing tens of thousands to St. Louis. But may not an exposition be too "big" for personal comfort and especially as an educational factor?

Not only are the grounds the largest ever used for exposition purposes, but the exhibits are said to be more numerous than ever before. One who has spent several days on the grounds will not hesitate to believe these statements, for he may walk from morning till night ever discovering new exhibits which he may not stop to inspect. Either he must specialize to the extreme and know where to find what he wants to see or he must be content with a rather superficial general impression.

From the points of view of the pharmacist who comes to the Exposition to be benefited professionally there is much to be desired. We venture to state, and this applies to the exhibits at large, that the present "grosser Jahrmarkt am Mississippi" as it has been called, will impress the thinking visitor with two important facts: First, there is such a thing, even in America, of making the exposition grounds too large; and secondly, of having too numerous exhibits.

There has been little else than praise for the exhibits made by Germany and those made by the United States Government. From the latter, commercialism is naturally excluded. It is largely excluded from the former by eliminating the individual exhibit. The object to be exhibited is not primarily the product e. g. of this or that "Farbenfabrik," but of German chemical industry. The German nation shows itself at its best by exhibiting the best of everything irrespective of the individual firm that produces it. This is no shortsighted policy even for the firm that is willing to have its individuality lost, as it were, in the general whole, for it as well as its competitor receives the benefit of the good impression of the whole, which is far greater than that produced by the individual exhibit at a far greater cost.

The great difference between an individual exhibit, a well grouped array of individual exhibits and a collective exhibit in which the individual exhibit has become an integral part of the whole may well be studied on the grounds. For our purpose of illustration, the chemical exhibits may better serve this purpose than any other.

As an illustration of the first class one of the finest exhibits of its kind may be mentioned, that of the local firm Mallinckrodt & Co. It is an individual exhibit on a magnificent scale, but its effect is lost to the host of visitors.

The British and French exhibits in the same building may be mentioned as illustrations of the second class. The former are the more elaborate and striking of the two. Yet even here we miss the unit of the exhibit as a whole, which is not duly compensated for by the splendor of some of the individual exhibits. It is a composite picture, caleidoscopic in its effect, which does not give the satisfaction of a well organized whole.

Finally, as an illustration of the third class, we find the German chemical exhibit in the Electricity and Machinery building. Why it should have been placed here does not become apparent to the casual observer, but its place on the grounds has nothing to do with its general character.

The distribution of the numerous chemical exhibits is certainly a matter of convenience to the visiting pharmacist, but in as much as chemistry touches human activity at so many points it would be useless to quarrel with those who had charge of the arrangement for a system of classification which differs from our own. A casual survey of the field, however, leads us to think that such a system, however well it may have looked on paper, certainly did not produce the practical results to be expected.

(To be continued.)

Acetic Acid Extracts.*

By *A. R. L. Dohme.*

For some years, efforts have been made to cheapen the cost of fluid and solid extracts of vegetable drugs by the use of acetic acid, more or less diluted, as a menstruum. I say "cheapen" advisedly because I believe that this is the main object to be accomplished by this innovation. To be sure, it has been claimed that alcohol is undesirable in these preparations to the physician and patient and that special remedial agents or correctives have to be administered to off-set the alleged injurious effect of the alcohol. No doubt, some physicians and some people confidently believe this to be generally true, just as some people think that any beverage containing alcohol is a dangerous and deleterous thing. These people are entitled to their opinion, but being in the enormous minority, they cannot be said to wield any power or carry any conviction. In my opinion, the contrary is more nearly true as regards medicine, viz: that the alcohol is almost always, except in a few special diseases or cases, a desirable addition to a medicine administered to a patient, because stimulation and consequent exhilaration are large factors in curing many ailments. My purpose in introducing this alcohol question is to point out that in the last analysis the question of price is at the bottom of the acetic extract. The prime difference between the acetic and alcoholic fluid menstruum is that the former does not extract oils and fats and the latter does not extract gums, starches, pectins, etc. Both extract the active principle of many drugs equally well, acetic acid not of all drugs but alcohol of all drugs. Advantage 1 for alcohol. Whether or not it is an advantage to have a fluid extract free of a few oils and fats but filled to over-flowing with inert extractive matter is not an open question, in my mind, although it may be to some other minds. I am prepared to prove to the satisfaction of any one that if an acetic fluid extract and an alcoholic fluid extract of the same drug are made in the same way, the acetic acid extract will deposit more copiously than the alcoholic extract.

---

* Read before the Scientific Section of the A. Ph. A. at Kansas City.

Advantage 2 for alcohol. Again, a comparison of these two fluid extracts as to their palatability, appearance, availability for dispensing with other drugs, and compatibility with other drugs will result decidedly in favor of the alcoholic preparation, for (1) an acetous smell and taste is not agreeable to most patients; (2) a dense, ofttimes syrupy, liquid is not as elegant in appearance as a mobile, less dense liquid; (3) a fluid extract heavily charged with extractive will not be as capable of admixture to aqueous or alcoholic liquids or other solid ingredients as a mobile, less heavily charged fluid extract; (4) the acid character and reaction of such an extract will introduce far more incompatabilities than a neutral alcoholic or aqueous alcoholic liquid. And, right here, from a practical standpoint, arises one of the main difficulties of the acetic extract. If acetic extracts should become official and druggists dispense them, how will they be able to dispense repeated prescriptions that had for years been dispensed with alcoholic fluid extracts? Either the phycician will have to write a new prescription, which is not always possible, as the physician may be dead or not available, or the druggist will have to carry a line both of alcoholic and acetic fluid extracts. It has been claimed that the objectionable features of acetic extract can be overcome by treating them with alcohol and thus precipitating all the inert extractive, but if alcohol is to be added eventually, what is the use of first extracting with acetic acid and where does the saving both in labor, time and money come in? For those drugs that contain oils, such as seeds especially, acetic acid makes an effective menstruum since the oils remain in the drugs, but methods are available to experienced pharmacists for obviating this difficulty while still using the alcoholic menstruum. The writer recently pointed out to the chairman of the sub-committee on fluid extracts how, in case of glycyrrhiza, it is possible to entirely avoid getting any of the undesirable acrid, bitter principle and yet produce an efficient alcoholic fluid extract of this drug, and, in the same way, methods are known and used for preparing fluid extracts of oily drugs without getting any oil into the fluid extract and yet producing an alcoholic fluid extract. The only advantage thus far given for acetic acid is hence shown not to be an advantage after all. Another disadvantage to the pharmacist in making acetic fluid extracts is the fact that maceration of many drugs with acetic acid causes them to swell to such an extent, even if in coarse powder, as to choke up the percolator and render percolation very difficult and tedious. Some experiments were recently made in my laboratory to discover if acetic acid destroyed any of the active principles of the drugs when used as a menstruum for making fluid and solid extracts, and I give below the results obtained:

Belladonna Leaf — 100 gm. in No. 20 powder assaying 0.57% total alkaloids were exhausted with 850 c. c. of 10% acetic acid, resulting in a brown dense liquid, with a sp. gr. of 1.13. The fluid extract was found to contain 0.54% total alkaloids, showing little or no loss of alkaloid. 100 gm. of this same fluid extract were evaporated to dryness on a water bath to a solid extract and yielded 35 gm. thereof, or 35% of extractive. (The official menstruum seldom extracts more than 25%.) This extract yielded 1.47% of total alkaloids or 0.52% of the drug. This shows a loss of 0.05 total alkaloids, i. e. 10%.

Colchicum Seed — 100 gm. in No. 20 powder assaying 0.41% colchicine were exhausted with 800 cc. of 10% acetic acid, resulting in a heavy brown liquid sp. gr. 1.098. This could be assayed in the usual way, but the inert matter had first to be precipitated by alcohol. The fluid extract assayed 0.41% colchicine, showing no loss of alkaloid. 100 gm. of this fluid extract were evaporated to dryness on a water bath and gave 23 gm. or 23% of solid extract (The alcoholic menstruum yields 15%.) assaying 1.65% colchicine. This when referred to the drug equals 0.38% colchicine, showing a loss of 0.03% colchicine, i. e. 8%.

Digitalis — 100 gm. in No. 20 powder assaying 0.42% digitoxin by Keller's method were exhausted with 900 c. c. of 10% acetic acid, resulting in a heavy brown liquid, sp. gr. 1.176, assaying 0.35% digitoxin and showing loss of 0.07%, i. e. 16%. 100 gm. of this fluid extract gave 47 gm. of solid extract on evaporation, or 47% of extractive, an enormous percentage necessarily resulting in a weak extract. (The official menstruum yields 25%.) This extract assayed 0.52% digitoxin, or when referred to the drug 0.24% digitoxin, showing a loss of 0.18% digitoxin or 42% of the digitoxin has been lost. This indicates very strongly that acetic acid hydrolizes some of the digitoxin and hence is no fit menstruum for the same.

Lobelia — 100 gm. in No. 20 powder assaying 0.45% lobeline ($C_{18}H_{23}NO_2$) were exhausted with 800 c. c. of 10% acetic acid, resulting in a heavy brown liquid sp. gr. 1.117 and assaying 0.39% lobeline. The loss here was 0.06% or about 14%. 100 gm. of the fluid extract were evaporated to a solid extract and gave 30 gm. of the same or 30% of extractive. (The official menstruum yields 25%), assaying 1.03% lobeline, or when referred to the drug 0.310% lobeline, showing a loss of 0.14% lobeline, i. e. 35%. Here also acetic acid apparently decomposes some of the lobeline, indicating its unfitness as a menstruum.

It is a peculiar but very suggestive fact that practically all the leading pharmaceutical manufacturers of this country are a unit against the use of acetic acid as a menstruum for fluid extracts after careful experiments in many cases as to its availibility. Certainly, if acetic acid would answer as well and serve the pharmacist as well at his dispensing counter, is it reasonable to presume that with its great cheapness as compared with the 1000% taxed alcohol and their exceptional facilities for experimentation in the laboratory and on the large scale practically that these manufacturers would not have adopted it long since, if it had any merits practically or scientifically.

The Determination of Codeine in Opium.*

By Charles E. Caspari.

It has always seemed strange that up to the year 1903 no method has ever been published for the determination of codeine in opium, especially as this alkaloid is such an important constituent of opium and is used so extensively. To be sure, every text book and reference book on chemistry states the percentage of codeine contained in opium, which is said to vary from 0.20% to 0.60%, and the question naturally arises "On what are these figures based?" It seems to me that the only basis which they have is the yield of codeine obtained by manufacturers on the large scale, and it can by no means be taken for granted that manufacturers succeed in extracting and obtaining as such all the codeine contained in opium. Letters sent to various chemists throughout the country have elicited the common reply that no method for the determination of codeine is known. One would naturally suppose that manufacturers would be desirous of knowing the codeine content of opium as well as the morphine content, in order to know the efficiency of their methods of extraction, and yet no attempts to obtain this information seem to have been made previous to 1903.

---

* Read before the Scientific Section of the A. Ph. A. at Kansas City.

In that year an article appeared by Van der Wielen in the Pharmazeutische Zeitung, page 267, on the determination of narcotine and codeine in opium. He had endeavored in vain to discover a method for the simultaneous determination of morphine and codeine. At the time that this article appeared the author was engaged in a similar piece of work and succeeded in élaborating a method for determining codeine different from that of Van der Wielen.

In order to permit a comparison of methods and results, both methods will be given.

According to Van der Wielen, 3 gms. powdered opium are shaken several minutes with 90 c. c. ether, 5 c. c. caustic soda (10% solution) are added and the mixture shaken frequently for 3 hours. Then 3 gms. calcium chloride are added, the whole allowed to stand 12 hours and 75 c. c. of the ethereal solution representing 2.5 gms. opium are poured off. Of this portion 60 c. c. ether are distilled off, the remainder is placed in a separatory funnel, the flask rinsed with 4 c. c. water and 1 c. c. dilute hydrochloric acid to dissolve the crystals which have separated from the ether and the ethereal solution is shaken with this aqueous solution. The aqueous layer is drawn off and the flask and ethereal solution are shaken repeatedly with 5 c. c. portions of 2.5% hydrochloric acid until every trace of alkaloid has been removed. This step must be performed rapidly, as the liquid has a tendency to turn red in consequence of the decomposition of some of the narcotine. The mixed acid liquors are next shaken with 25 c. c. ether and rendered alkaline with a 10% solution of caustic soda. The ether is drawn off into a flask containing 5 gms. calcium chloride. It is shaken for ten minutes with the calcium chloride and filtered into a small flask. Then the alkaline aqueous liquid, the calcium chloride and the filter are treated with portions of 10 c. c. ether until all alkaloid has been removed. From the ethereal solution, the ether is distilled off and the residue is dissolved in 4 gms. 90% alcohol with the aid of heat. The alcoholic solution is allowed to stand 24 hours, and the crystals which separate out are collected on a filter washed with 5 c. c. alcohol and dried at 100°, then weighed. A correction must be added for the narcotine which remains in the alcoholic mother liquor. The codeine is determined in the alcoholic filtrate from the narcotine and in the wash liquors. These are mixed and to the mixture are added 10 c. c. water; the whole is evaporated to a volume of 10 c. c. and allowed to stand 24 hours. During this time resinous masses separate out and these are filtered off. Then the dish and filter are washed three times with 5 c. c. water. To the washings 5 c. c. $\frac{N}{100}$ sulphuric acid are added and also 3 drops haematoxylin. The excess of acid is determined by means of $\frac{N}{100}$ alkali. From these figures can be calculated the amount of codeine present, using the formula $C_{18}H_{21}NO_3 + H_2O$ for codeine. According to this method Van der Wielen obtained the following results:

Asia Minor Opium No. 1	1.08%
Asia Minor Opium No. 2	1.29%
Persian Opium	1.51%

According to the process of the author, the method of procedure is as follows:

50 gms. opium are extracted with water as in the U. S. P. 1890 method for the assay of opium, except that, since five times as much material is used, there will also be five times as much aqueous extract. This aqueous extract is then evaporated on the water-bath to a volume of about 250 c. c., 5 grams. of barium acetate are added and the solution diluted to about 700 c. c. The barium acetate precipitates the meconic acid and much of the resin. The diluted solution is then filtered, the precipitate thoroughly washed with cold water and the filtrate and washings are again concentrated, when 5 gms. barium acetate are added again, and the solution again diluted and filtered. These steps of concentrating, adding barium acetate, diluting and filtering are repeated until the addition of barium acetate followed by dilution produces no further precipitate. The solution is again concentrated and a slight excess of a 10% solution of caustic soda is added. This causes the thebaine, papaverine and narcotine to be precipitated, while the morphine, codeine and narceine remain in solution. The solution is filtered, the precipitate thoroughly washed with water, the filtrate and washings rendered

acid with dilute hydrochloric acid and concentrated by evaporation on the water-bath. To the concentrated solution 2% ammonia water is added in excess. This causes the precipitation of most of the morphine, which is filtered off and thoroughly washed. The filtrate and washings are rendered acid with hydrochloric acid and again concentrated. Ammonia water (2%) is again added in excess, and if any more morphine is present, it will be precipitated. If necessary filter, wash, acidify with hydrochloric acid and concentrate to about 75 c. c. Then render alkaline with 2% ammonia water and extract the alkaline aqueous solution with benzene. The benzene will remove the codeine, but not the narceine. Of course the "shaking out" with benzene must be repeated until 5 c. c. of the benzene evaporated leaves no alkaloidal residue. The benzene is then evaporated and the codeine obtained may be either weighed or titrated. As the residue obtained from the benzene is not crystalline and is colored, it has seemed best to the author to determine the codeine by titration. To the residue is added an excess of $\frac{N}{10}$ sulphuric acid and the excess is determined by means of $\frac{N}{10}$ alkali, cochineal being the indicator used. By this method two determinations have been made on the same sample of powdered Smyrna opium; in one case 1.12% codeine ($C_{18}H_{21}NO_3 + H_2O$) was found, and in the other 1.33%.

Unfortunately it has not been possible for lack of time to make more determinations, and it is not expected that the method will be accepted on the meagre results here given. Still it is significant and more than a mere coincidence that two experimentors, working on different samples of opium, by different methods, in different countries should both find more than 1% of codeine in powdered opium, while manufacturers never succeed in obtaining that much from it on a large scale.

Of course the author does not claim that his method is perfect, nor does he claim that opium does contain more than 1% of codeine, and that all the present processes used by manufacturers for obtaining codeine from opium are faulty. Nevertheless such a possibility exists and it will take much more work to either prove or disprove it. It certainly cannot be denied that manufacturers should be able to check their processes on a large scale for obtaining codeine by an assay on a small sample just as they do in the case of morphine. It is intended to continue this work on the assay of opium for codeine and it is hoped that in the near future more definite results may be announced.

In conclusion it may not be amiss to criticize a little the two methods herein described. In the author's opinion there are two serious objections to Van der Wielen's method. In the first place the amount of material used for the assay is too small. 3 gms. of opium yield a very small amount of codeine and it would be very easy to lose some of this enroute during the many steps involved in the method. It seems incongruous to use only 3 gms. of opium in the assay for codeine while for morphine of which there is ten times as much in opium as of codeine, ten grams of opium are usually used. In the second place, Van der Wielen uses an aliquot part of his ethereal solution and the use of aliquot parts, especially where the solvent is such a volatile one as ether, is always to be deprecated. This source of error is magnified in importance when we consider the small amount of opium used in the assay. Now, against the author's method the criticisms may be raised that too much material is used, that the process is too tedious and that there is too much subjection to heat. A large amount of opium must be used to start with because the amount of codeine which it contains is so small, and if a little is lost during the assay it does not form such a large percentage of the whole, as it would if only a small amount were used to start with. That the process is tedious and slow cannot be denied, and yet, if the results are accurate, in place of something better, this objection vanishes. During the assay the alkaloids are subjected to heat for quite a long time, but always in the form of salts and the temperature does not rise above 100° C. This might be an objection in the case of some of the other opium alkaloids, but in the case of codeine which is known to be a remarkably stable alkaloid, it is held that not much weight can be attached to this criticism.

However, it must be left for future work to decide which of these two methods is the more reliable.

Laboratory of Meyer Bros. Drug Co.,
St. Louis.

Pharmaceutical Journals.*

By *H. P. Hynson.*

Interest in the Journal Club and its purposes, suggested the propriety of reviewing, carefully, one issue of some journal and of making such a review the subject of this paper. At first thought, this would seem a comparatively easy task, since one would, naturally, expect to find so much of real value; so much that was new; so much to interest scientific pharmacists.—But, when the one had been casually looked over, another, even three of the current issues of popular publications, surprise followed and, when the same had been carefully examined, amazement was the feeling caused by a realization of the fact that a person with ordinary intelligence could scan a half dozen or more journals every month and still be without the slightest conception of their real make up. The revelation was so startling as to make it appear that a classified summary of the contents of the leading journals would be something, both profitable and interesting to contemplate. It would also seem a fit basis for further and more detailed discussion of this important subject.

Five of the more popular and conventional journals and one of a more scientific nature were carefully surveyed and the matter presented by them properly classified—with results as appear in the attached tables. Names, as will be seen, are not used and the fact that two of the publications appear more than once a month is not considered, nor is the fact that different size type is used, duly regarded as it probably should be. The space is estimated in square inches as accurately as possible. Comparisons may be made by square inches or by the percentage of space, which refers to the entire offering of the particular journal to which it applies. The matter will be found divided into editorial, original, extracts, news, illustrations; the original matter and extracts will be sub-divided into pharmacy, collateral sciences, commercial, advertising and fiction.

While criticism of the journals examined is not intended, because of the showing they make, the character of the editorials must strongely impress the loyal and ambitious pharmacist, since they touch upon nearly every other subject but the strictly pharmaceutical; commercialism, ethics, education, legislation, but never a glimmer of light falls into the dark dangerous, untrodden places of practical pharmacy and dispensing. The very large amount of space given to news items, including reports of conventions, strikes one as quite remarkable and leads us to wonder if this is well used. Is the time spent in reading this news and gossip well employed? Could it not be much more profitably directed to good strong discussions of pharmaceutical practices, often times involving intricate chemical reactions? The "News" feature seems to be enlargening out of proportion and this tendency is significant.

---

* Read at the last annual meeting of the Maryland Pharm. Ass'n.

It may be well, also, to note that, while the original matter is largely pharmaceutical, the extracts are almost entirely made up of collatoral scientific and irrelevant items. It was pleasing to find that two of the most creditable articles in the journals were written by two of our younger members, Messrs. Lowry and Dunning.

A general conclusion arrived at from this survey and its comparison with a less complete one, made of medical journals, is that, pharmaceutical publications are not quite practical enough. They do not recount the actual doings and difficulties of the real practitioner of pharmacy; something like the clinics of Medicine do not appear, nor do the helpful citing of cases hold place. Pharmaceutical problems are rather superficially discussed by the writers who undertake to treat this class of subjects and one is quickly impressed by the difference between this want of thoroughness, on the part of the pharmaceutical writer, and the possession of it, by the contributor to other sciences.

It is but fair to state that the managers of Pharmaceutical journals are much more liberal to their contributors than are the managers of Medical journals. This willingness to pay for good articles should have, as it, no doubt, will, a very helpful effect upon the character of articles hereafter appearing and should encourage those, with ability to write, to devote honest painstaking effort to their work of this kind.

Finally, in truth, it must be said that there is not, in the much greater mass of pharmaceutical literature, more of substance and more of worth, but greater dilution, which is often carried to a very "high potency."

Comparison of Space.

(Square inches.)

Journal	Total	Editorial	Original	Extracts	News	Illustrations	ORIGINAL					EXTRACTS		
							Pharm.	Coll t'l Science	Commer.	Fiction	Adver.	Pharm.	Collat'l Science	Adver.
A	2400	185	665	460	915	205	355	95	40		120	120	340	
B	2350	140	540	810	450	80	230	360	100		180	245	475	90
C	2300	350	1140	175	325	260	385	195	190	180	220	125	50	
D	1900	175	480	210	910	120	150	70	140		70	70	160	60
E	1400	140	210	140	775	80	40		60	110		80	90	20
F	1000	240	365	250	115	80	75	240				130	90	

Comparison of Space.

(Percentage.)

Journal	Editorial	Original	Extracts	News	Illustrations	ORIGINAL					EXTRACTS		
						Pharm.	Collat'l Science	Commer.	Fiction	Adver.	Pharm.	Collat'l Science	Adver.
A	7	27	19	38	8	14	4	2		5	5	14	
B	5	22	34	19	3	9	15	4		7	10	20	3
C	15	49	7	14	11	16	8	8	7	9	5	2	
D	9	22	11	47	6	7	3	7		3	3	8	3
E	10	15	10	55	5	3		5	8		2	6	1
F	24	36	25	11	3	7	24				13	9	3

The Study of Phytochemistry.*

By *Edward Kremers.*

Liebig has been regarded as the founder of scientific organic chemistry. In as much as early organic chemistry was largely the chemistry of plant substances, and since modern phytochemistry is intimately associated with and so largely dependent on organic chemistry, one does not feel surprised upon finding a chemical historian who practically dates the modern development of phytochemistry from the productive period of Liebig and his students.[*]

---

* Read before the Section on Education and Legislation at the Kansas City meeting of the A. Ph. A.

Though Liebig revolutionized organic chemistry and thereby laid the foundation for a new phytochemistry, organic and plant substances were studied by chemists scientifically before his time. While it is true, as Kopp[†] points out, that up to the close of the phlogistic period, organic substances were rarely studied for their own sake, but rather as pharmaceutical agents, or as dye stuffs or for other technical reasons, it is equally true that toward the close of this period Scheele's and Bergmann's investigations paved the way for this new science.[‡] Indeed, of such importance is the work of Scheele along this line that he has been pronounced the founder of modern phytochemistry.[§] It is claimed that he was the first to point out that plant substances can be and should be isolated as chemical individuals, and that this step marks such a degree of progress that he is entitled to the distinction of being regarded as the founder of modern phytochemistry.

According to the classification of all natural objects into the three kingdoms, the mineral, vegetable and animal, chemists toward the close of the 17. century began to classify chemical substances in like manner.[¶] The expression "chemical substance", however, is not, in this case, synonymous with chemical individual, for Lemery includes chemical mixtures and even parts of plants in that part of his chemical treatise devoted to the vegetable kingdom.[‖]

About 1780 Bergmann began to distinguish organic from inorganic substances. However, it was only after it could be shown that many organic individuals were found in both the animal and vegetable kingdom, that the older classification was gradually dropped and the newer one adopted.

---

[*] E. v. Meyer, Geschichte der Chemie: — "Die in grosser Mannigfaltigkeit von den Pflanzen erzeugten Stoffe sind namentlich seit Liebig's anregendem Wirken Gegenstand eifriger Forschung gewesen: parallel der Zoochemie hat sich insbesondere seit Ende der vierziger Jahre die Phytochemie entwickelt."

[†] Geschichte der Chemie, Bd. IV, p. 286.

[‡] Ibidem.

[§] Rosenthaler, Die Pflanzenchemie von Du Clos bis Scheele. Berichte d. d. ph. Ges., 14, p. 296.

[¶] e. g, Lemery, Cours de Chimie.

[‖] Cours de Chimie, pp. 599 to 802 of the edition of 1756. (The second part of this book is devoted to "vegetables" or vegetable substances. In addition to a few substances now regarded as chemical individuals, such as camphor and tartar, it includes such mixtures as turpentine and aloes, also organized drugs such as jalap, cinchona bark etc.

(*To be continued.*)

Pure Granulated Salts.

We make a large line of these salts and earnestly recommend them for elegant dispensing. They are of exceptional purity, make brilliantly clear solutions, and cost no more than the ordinary crystals. Ask for our original packages.

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS NEW YORK

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised
Culbreth's Materia Medica and Pharmacology
THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street
PHILADELPHIA
111 Fifth Avenue
NEW YORK

LIVERPOOL, England. To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. Price, 77 Lord Street, Liverpool, England.

BLOCKI'S
IDEAL Perfumes IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High **Grade** Guaranteed Bicycles.

New 1903 Models

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High Grade	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

*Any other make or model you want at one-**third** usual price.* Choice of any standard tires and **best** equipment on all our bicycles. *Strongest* ***guarantee.***

We ***SHIP ON APPROVAL*** C. O. D. to any one *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels **$3 to $8**
taken in trade by our Chicago retail stores, all makes and models, good as new............

ESTABLISHED 12 YEARS

DO NOT BUY a bicycle until you have writen **for our** FACTORY PRICES AND FREE TRIAL **OFFER.**

Tires, equipment, sundries and sporting goods of all kinds, at half regular **price.** in our big free sundry catalog. Contains a world of useful information. Write for it.

J. L. MEAD CYCLE CO., Chicago, Ill.

The Open Court

AN ILLUSTRATED MONTHLY MAGAZINE

Devoted to the Science of Religion, The Religion of Science and the Extension of the Religious Parliament Idea.

10 cents per copy - - - - - - $1.00 per year

SCIENCE is slowly but surely transforming the world. Science is knowledge verified; it is Truth proved; and Truth will always conquer in the end. The power of Science is irresistible. Science is the still small voice; it is not profane, it is sacred; it is not human, it is superhuman; Science is a divine revelation.

Convinced of the religious significance of Science, *The Open Court* believes that there is a holiness in scientific truth which is not as yet recognized in its full significance either by scientists or religious leaders. The scientific spirit, if it but be a genuine devotion to Truth, contains a remedy for many ills; it leads the way of conservative progress and comes not to destroy but to fulfil.

The Open Court on the one hand is devoted to the _Science of Religion;_ it investigates the religious problems in the domain of philosophy, psychology, and history; and on the other hand advocates the _Religion of Science_. It believes that Science can work out a reform within the Churches that will preserve of religion all that is true, and good, and wholesome. Sample copies of _The Open Court_ sent on request together with illustrated catalogue of important publications for the Study of Religion. Published by

THE OPEN COURT PUBLISHING COMPANY, 324 Dearborn St., Chicago.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

NEW NOVELS.

The day of the dog, by George Barr McCutcheon. (Dodd, Mead)	$1.25
ir Mortimer, by Mary Johnston. (Harpers)	1.50
ly Mamie Rose, by Owen Kildare. (Baker & Taylor) Net	1.50
illie, a Mennonite maid, by H. R. Martin. (Century)	1.50
The crossing, by Winston Churchill. (Mac Millan Co.)	1.50
he seiners, by James B. Connolly. (Chas. Sribner's Sons)	1.50
velyn Byrd, by George C. Eggleston. (Lothrop)	1.50
rave hearts, by W. A. Fraser. (Chas. Scribner's Sons)	1.50
he Barrier, by Allen French. (Doubleday, Page & Co.)	1.50
he light of the star, by Hamlin Garland. (Harpers)	1.50
he singular Miss Smith, by Florence Morse Kingsley. (MacMillan)	1.25
he faith of men and other stories, by Jack London. (McClure, Phillips)	1.50
y snare of love, by Arthur W. Marchmont. (Stokes)	1.50
ruvver Jim's baby, by Philip V. Mighels. (Harpers)	1.50
he Villa Claudia, by John A. Mitchell. (Life)	1.50
nna the adventuress, by E. Phillips Oppenheim. (Little, Brown)	1.50
red in the bone, by Thos. Nelson Page. (Chas. Scribner's Sons)	1.50
he cost, by David Graham Phillips. (Bobbs-Merrill Co.)	1.50
he flame-gatherers, by Margaret Horton Potter. (MacMillan)	1.50
he by-ways of Braithe, by Frances Powell. (Chas. Scribner's Sons)	1.50
ort Amity, by A. T. Quiller-Couch. (Chas. Scribner's Sons)	1.50
he castaway, by Hallie Erminie Rives. (Bobbs-Merrill) Net	1.00
he bright face of danger, by Robert Neilson Stephens. (Page)	1.50
gingham rose, by Alice Woods Ullman. (Bobbs-Merrill)	1.50
he descent of man, and other stories, by Edith Wharton. (Chas. Scribner's Sons)	1.50
ings and Queens I have known, by Helene Vacaresco. (Harpers) Net	2.00
he Republican Party, by Francis Curtis. 2 vols. (Putnams) Net	6.00
uman work, by Charlotte Perkins Gilman. McClure, Phillips) Net	1.50
orking with the hands, by Booker T. Washington. (Doubleday, Page) Net	1.50
ddresses and Presidential messages, by Theodore Roosevelt. (Putnams)	1.25
New Hampshire, by Frank B. Sanborn. (Houghton, Mifflin) Net	1.10
The mystic mid-region; the deserts of the Southwest, by Arthur J. Burdick. (Putnams) Net	2.00
Whittier-land, by Samuel T. Packard. (Houghton, Mifflin) Net	1.00
Olive Latham, by E. L. Voynich. (Lippincotts)	1.50
The woman errant, by the author of "The garden of a commuter's wife. (MacMillan)	1.50
The grafters, by Francis Lynde. (Bobbs-Merrill)	1.50
The second Mrs. Jim, by Stephen Conrad. (Page)	1.00
The givers, by Mary E. Wilkins Freeman. (Harpers)	1.25
In search of the unknown, by Robert W. Chambers. (Harper)	1.50
A Texas matchmaker, by Andy Adams. (Houghton, Mifflin)	1.50
Later adventures of Wee McGregor, by J. J. Bell. (Harper)	1.25
The daughters of desperation, by Hildegarde Brooks. (McClure, Phillips)	1.25
The queen's quair, by Maurice Hewlett. (MacMillan)	1.50
The Merry Ann, by S. Merwin. (MacMillan)	1.50
Said, the fisherman, by M. Pickthall. (McClure, Phillips)	1.50
Order No. 11, by C. A. Stanley. (Century)	1.50
A woman's will, by Anna Warner. (Little, Brown)	1.50
The rainbow chasers, by J. H. Whitson. (Little, Brown)	1.50
The Test, by M. T. Wright. (Scribners)	1.50
Sally of Missouri, by R. E. Young. (McClure, Phillips)	1.50
Uncle Mac's Nebrasky, by W. R. Lighton. (Holt)	1.25
The shame of the cities, by Lincoln Steffens. (McClure, Phillips) Net	1.20
By the fireside, by Chas. Wagner. (McClure, Phillips) Net	1.00
Nancy Stair, by Elnior M. Lane. (Appletons)	1.50
Nature's comedian, by W. E. Norris. (Appletons)	1.50
My li'l' Angelo, by Anna Y. Condict. (Appletons)	1.25
Man and Superman, by G. Bernard Shaw. (Brentanos) Net	1.25
Elizabeth's adventures in Rügen. (MacMillan)	1.50
The Penobscot man, by Fannie H. Eckstorm. (Houghton, Mifflin)	1.50
The great adventurer, by Robert Shackelton. (Doubleday, Page)	1.50
Bird center cartoons, by John T. McCutcheon. (McClure) Net	1.25
The highroad, being the autobiography of an ambitious mother. (Stone)	1.50
The issue, by George Morgan. (Lippincotts)	1.25
The double garden, by Maurice Maeterlink. (Dodd, Mead) Net	1.40

BAEDEKER'S GUIDE BOOKS.

Illustrated with numerous Maps, Plans, Panoramas and Views.

12 mo., cloth flexible. Prices are net.

he United States. With an Excursion into Mexico. (New Edition)	$3.60
anada. (New Edition)	1.50
ustria	2.40
astern Alps	3.00
gypt	4.50
rance (Northern)	2.10
ermany (Northern)	2.40
ermany (Southern)	1.80
reat Britain	3.00
reece	2.40
aly, Northern	2.40
Italy, Central, and Rome	2.25
Italy, Southern, and Sicily	1.80
London and its Environs	1.80
Norway, Sweden, and Denmark	2.40
Palestine and Syria	3.60
Paris and its Environs	1.80
Rhine	2.10
Switzerland	2.40

Postage additional about 10%.

Stedman, Complete Pocket-Guide to Europe. Flexible Leather, postpaid	$1.50

GRANT ALLEN'S HISTORICAL GUIDES.

aris, by Grant Allen	$1.25
lorence, by Grant Allen	1.25
ities of Belgium, by Grant Allen	1.25
Venice, by Grant Allen	1.25
Cities of Northern Italy, by G. C. Williamson	1.25
Umbrian Towns, by Mr. & Mrs. J. W. Cruickstank	1.25

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,

MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

EXTRACT OF BEEF
MADE ACCORDING TO PROCESS OF
PROF. JUSTUS VON LIEBIG
FROM FRESH BEEF OF PRIME QUALITY
GUARANTEED PURE
A quarter of a teaspoonful dissolved in a cup of boiling water produces instantly a strong beef tea or bouillon
Add a little salt, or celery salt
MANUFACTURED BY URUGUAY BEEF CO. GENERAL OFFICES HAMBURG, GERMANY
SOLE AGENTS FOR THE UNITED STATES OF AMERICA LEHN & FINK NEW YORK
MADE IN URUGUAY

Uruguay Beef Extract

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or domestic. Besides possessing all the stimulating and nutritive properties of a high grade Beef Extract, it is sold at a price which allows dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.

Sole Importers.

FORMIN. Hexamethylene-tetramine Merck. Presents this ide urinary antiseptic in its highest obtainable purity. In powder form, o *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectan Used the world over. Beware of imitations, which are poisonous and a the same time possess less disinfectant power. See that the signatur of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable tha the real virtues of cod-liver oil reside in an active principle or principles Gaduol is the alcoholic extract of the active principles of cod-liver oil It produces a stimulant and alterative effect on the processes of nutritio and absorption, and does not disturb the appetite or affect the stomach A wine of cod-liver oil prepared from Gaduol is a favorite tonic and ha a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of man babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS

WITH THE CO-OPERATION OF

Prof. J. H. BEAL, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. CHAS. CASPARI JR., Professor of Pharmacy, Maryland College of Pharmacy.
Prof. VIRGIL COBLENTZ, Professor of Chemistry and Physics. New York College of Pharmacy.
Dr. R. FISCHER, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. KRAEMER, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. LLOYD, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. LYONS, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. POWER, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. PRESCOTT, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. PUCKNER, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. SCHLOTTERBECK, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. WM. SIMON, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. STEVENS, Professor of Pharmacy, University of Michigan.
Dr. R. H. TRUE, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 10. OCTOBER, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

The founding of the Lloyd library. By *John Uri Lloyd*........ 357

The deficiency in the supply of assistant pharmacists, and the necessity for a longer probationary period. By *J. H. Beal*........ 361

Notes on certain reactions of the cinchona alkaloids. By *A. B. Lyons*........ 365

The use of potassium bi-iodate for standardizing volumetric solutions. By *Charles E. Caspari*........ 371

Balsam copaiba. By *A. R. L. Dohme* and *H. Engelhardt*........ 376

Report on the examination of some official drugs. By *Daniel Base*........ 389

The study of phytochemistry. By *Edward Kremers*........ 394

Vaccine Season

Now is the time to sell vaccine. Schools are opening, children are being vaccinated, and druggists should make special efforts to secure the business.

For five years Stearns' Vaccine has been on the market. It has always been good: it was never better than it is to-day. It gives the largest percentage of successful vaccinations.

Offered in two forms, both glycerinated: Improved Points and Capillary Tubes. The points are the most convenient of all vaccine points.

Per package of 10 (tubes or points) 60 cents, **net.**

Order from your jobber, or direct.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,

913-917 Cherry St.,

PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

Hygienic Exhibition, Berlin, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

International Exhibition, Barcelona, 1889.
GOLD MEDAL.

Teplitz, 1879,
LARGE GOLD MEDAL.

Amsterdam, 1889,
LARGE GOLD MEDAL.

Moscow, 1872,
LARGE GOLD MEDAL.

Vienna, 1873.
MEDAL OF PROGRESS.

Vienna, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., **Etc.**

ENDERMOL

neutral, bland, odorless,
stable, mollient, penetrating,

MAKES

Smooth Ointments with all Drugs

1-lb. tins, 50c. per lb.
5-lb. tins, 45c. per lb.

Send for literature.

SCHERING & GLATZ,
NEW YORK.

PASTEUR DRY ANTITOXIN

KEEPS INDEFINITELY

NO LOSS
NO DELAY
NO FAILURE

ONE SIZE
ONE STRENGTH
ONE DOSE

RIGHT PRICE

DON'T WAIT UNTIL DIPHTHERIA PREVAILS

BUY NOW FROM
SHARP & DOHME
SOLE DEPOSITARIES
UNITED STATES OF AMERICA

No other Antitoxin is considered worthy of imitation

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

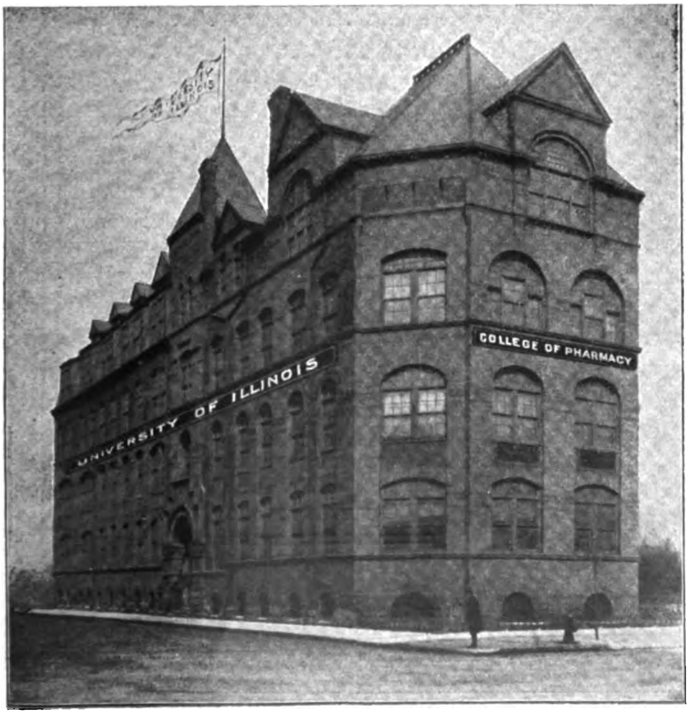
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK



University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

Antidiphtheritic Serum

PARKE, DAVIS & CO.

THOUSANDS OF PHYSICIANS USE IT EXCLUSIVELY

They know that it is accurately standardized. They know that there is no question of its safety and potency. They know what results to expect.

⁂

Marketed in our well-known

PISTON-SYRINGE CONTAINER

—the most practical "ready-to-use" serum syringe ever devised.

⁂

There will be an enormous demand for our Antidiphtheritic Serum during the coming months of fall and winter. Stock it liberally and tell your medical friends that you are prepared to supply it.

(Bulbs of 500, 1000, 2000, 3000 and 4000 units.)

LET US HAVE YOUR ORDER NOW.

PARKE, DAVIS & CO.

Home Offices and Laboratories, Detroit, Mich.

Pharmaceutical Review.

VOLUME 22. OCTOBER, 1904. NUMBER 10.

The Founding of the Lloyd Library.*

By *John Uri Lloyd.*

The founders of the Lloyd Library, John Uri Lloyd (born 1849), and Curtis Gates Lloyd (born 1859), were reared as boys in Boone County, Kentucky. Their parents were school teachers from North Bloomfield, New York, who in 1853 moved to that section of Kentucky, the father engaging in railway engineering, which was a part of his vocation. The immediate cause of his moving to Kentucky was the surveying of a railroad line between Covington and Louisville, the family locating at Burlington, Boone County, near the line of survey.

When the older of the boys reached the age of fourteen (1863), he was apprenticed to the pharmaceutical firm of W. J. M. Gordon and Brother, in Cincinnati, the object being the learning of the drug business. After his period of apprenticeship expired, he was again apprenticed to George Eger, opposite the "Mohawk Bridge," on Central Avenue, in what was then the German section of Cincinnati, the object being the learning of the German phase of the prescription business. After this apprenticeship expired, he returned, as prescription clerk, to the employ of O. F. Gordon, Eighth and Central Avenue, the firm of Gordon and Brother having in the meantime dissolved, Mr. O. F. Gordon retaining the apothecary business. In this store the young apprentice had previously made the acquaintance of Professor John King, M. D., the author of the American Dispensatory, whose practice both at home and by consultation was large, and who now gave into Lloyd's special hands the making of all his prescriptions. It was here that, in 1870, at Professor King's request, his first contribution to pharmacopœial literature was made, through the Eclectic Medical Journal, 1870, the subjects being:

---

* This paper is the result not only of a personal request, but because most visitors at the Lloyd Library ask the Librarian for just such information as is herein conveyed. The historical data have been brought together by the only person in a position to give these facts and contributed to the Historical Section of the American Pharmaceutical Association at its annual meeting, September 1904.

Simple Syrup of Stillingia, and Compound Syrup of Stillingia (p. 460), and Ointment of Bittersweet and Compound Syrup of Hoarhound (p. 530). In connection with this it may not be amiss to copy the introduction to these articles by Professor King (pp. 435—6, E. M. T. 1870):

"I have not been fully satisfied with several of the formulæ, given in my Dispensatory, of some of our most valuable compounds, and which will require some slight changes in order to procure reliable preparations, of full strength. In practice, I have found some of them to fall short in their action, not producing the effects that should be expected from their administration, while others form very turbid compounds, more or less subject to change, and sometimes quite unpalatable. With a view to obviate these difficulties and present formulæ by which even the less skilled may succeed in making good medicinal compounds, I have engaged a young man who is a talented and skillful pharmaceutist, Mr. J. U. Lloyd, now in Mr. O. F. Gordon's drug store, to experiment with these unsatisfactory preparations, and ascertain what improvements can be made therein. The results of his experiments will be published from time to time, in the Eclectic Medical Journal, so that our druggists may be enabled to repeat his processes, and, I hope, report their success or unsuccess to me as early a period as possible." JOHN KING.

Finally (1879), under the personal request and arrangements made by Professor King and Dr. John M. Scudder, the young man arranged to take charge of the laboratory of H. M. Merrill and Company, agreeing to devote his time and care to the subject of the Eclectic Materia Medica and its preparations. It was found that the literature in this direction was very much scattered, and in order to acquaint himself with the record of the past, it was essential that he should obtain for reference a complete file of the standard Eclectic publication known as the Eclectic Medical Journal, together with its antecedent (seven volumes (1836 to 1848), of the Western Medical Reformer. A systematic search for these volumes was instituted, the result being that on their completion, it was found that so many references were made to out of sight works of the early Eclectics, both in serial and in book form, as to render it necessary that these also should be in hand. A search of the United States for literature connected with these problems followed. In this search, advertisements were carried in the Eclectic and related current journals of the day, physicians of the olden times were personally solicited, and the second hand bookstores were continually watched, the aim being, as has been said, to place the investigator in a position where he could creditably serve the interests of the Eclectic School in Medicine which, as is well known, had from its incipiency made a specialty of American drugs and the products of American plants.

About this date the younger of the two brothers, Curtis Gates Lloyd, came from Kentucky to Cincinnati, and engaged in the prescription business with a painstaking pharmacist, Dr. Johnson, corner Elm and Ninth Sts., where he was located when he afterwards passed the examination before the Cincinnati Pharmaceutical Examining Board, and received a certificate as a pharmacist. His inclination being toward Botany, after affiliating himself in business with his brother, the same reason that had led his elder brother to sacrifice both time and money for the purpose of obtaining a special line of publications that would enable him to do his work creditably, led the younger brother to begin a like collection concerning American Botany. This field broadened, and soon he found himself searching the literature of outside countries for special publications bearing on the subject of early American Botanical History, especially that portion connected with plant products.

Thus it was that, without any thought of doing more than fortifying their own work and investigations in what was then largely an untrodden field, they together laid the foundation for this special library. As time progressed, it was found that the field of research broadened and radiated in many directions outside the original line. Works in foreign languages became involved, as well as special treatises concerning investigations made in outlying countries, and finally the search for library literature included whatever concerned Botany, Pharmacy, Plant Chemistry or Materia Medica and Medical Practice in any country and in all languages.

In a short time, the section on Botany and allied sciences dominated the field, outclassing the original collection, both as concerns numbers of volumes and financial investment.

It will be remembered that the founding of the library was due to the necessity of investigating American drugs and Eclectic preparations. Be it recorded that the thoughtful members of the Eclectic

School in Medicine, realizing the importance of such a collection in general medicine as well as to themselves, have ever taken a special interest in its evolution. They have generously contributed to its shelves such publications concerning early Eclectic literature as came to their hands. Professor John King before his death (1893) donated to it his entire library. Professor John M. Scudder gave from his collection all that the library needed which he had not already donated to the Library of Congress. Dr. S. B. Munn, of Waterbury, Connecticut, Dr. Henry Wohlgemuth of Springfield, Illinois, Dr. V. A. Baker of Adrian, Michigan, Professor H. T. Webster, M. D., of Oakland, California, Professor H. W. Felter, M. D., the Eclectic Historian, and many others, donated large consignments of pamphlets, miscellaneous journals, and books. Indeed, it would be impossible to undervalue the many encouragements afforded by the members of the Eclectic School in Medicine, long before the Library was known to the outside world. But although its founders moved quietly and self-sacrificingly, asking no general conspicuity, it was natural that scholars to be benefitted should finally take an interest in what came to be their own cause. This is evidenced by the fact that physicians of all medical schools today recognize the helpfulness of the Lloyd Library, which is now thrown open to the world by act of incorporation, which makes it public to the uses of the world. Conspicuous members of all the schools in medicine appreciate that its contents, now free to all, are to be donated intact to the cause of education, and finally placed in the teaching institution in America where, as an impartial committee shall decide, the greatest good can be done to the greatest number. Members of the various schools in medicine and the pharmaceutical profession and of all allied interests, the editors of the journals in pharmacy and medicine, authors of books bearing on the library field, are not only taking an active interest in its evolution, but are finding that even now its contents are invaluable to those who propose to make a special line of research in any direction whatever that concerns its province.

To recapitulate. What is now known as "The Lloyd Library" is a plant that was instituted for the purpose of enabling its founders to ply their vocation, pharmacy, better than could be accomplished without it. It is an outgrowth of the necessity for information concerning the American Materia Medica and the Eclectic preparations, which had become a special study of its founders. This restricted field widened, lengthened and radiated in different directions until the special collection of books and journals, which was the founders' aim, came to be but a fragment of the Library. From a library restricted mainly to the interests and uses of the brothers who founded it, and the service of the school in medicine that first gave it their helpful attention, it has grown to be a cosmopolitan collection, conducted by a professional librarian, with several assistants. It is systematically arranged, and embraces the entire subjects of Botany. Pharmacy, Materia Medica, Practice, Plant Chemistry, and affiliated Society and Academy Transactions. The first series of books completed for the Library shelves was the Eclectic Medical Journal, of Cincinnati, while the book to be considered as the initial volume is a little Bible that was placed in the valise of the older of the brothers by his mother when, as a boy, he left his Kentucky home in 1863, to engage as an apothecary's apprentice in Cincinnati.

The Deficiency in the Supply of Assistant Pharmacists, and the Necessity for a longer Probationary Period.*

By *J. H. Beal.*

For several years there has been an unusual, not to say a remarkable, demand for qualified assistant pharmacists. Investigation shows that this demand is not local but general, that it exists in nearly all sections of the United States, and as much in the rural districts as in the large cities, except in such favored localities as California, where the climate is an attraction, or in St. Louis, where many have been drawn by the wonders of the Louisiana Purchase Exposition.

Undoubtedly the general business revival of late years has been partially responsible for this condition, but not altogether so. The principal reason is found in the pharmacy laws, in that they do not require of all candidates a probationary period of registration as assistant, before granting full registration as registered pharmacists with authority to become the responsible managers of drug stores.

The Ohio law, for example, requires two years' experience of applicants for the assistant's certificate, and four years from applicants for registered pharmacist's certificate. It is not necessary for the candidate to first register as an assistant unless he voluntarily chooses to do so, nor if he is registered as such is it necessary for him to remain on the rolls as assistant for any specified period of time. He can if he have the total required experience, apply immediately for a pharmacist's certificate.

---

* **Read before the Commercial Section of the A. Ph. A. at the Kansas City meeting.**

Similar requirements are found in many other states of the Union.

The Effect of the Law.

The practical effect of this lack of a probationary period between registration as assistant and registration as pharmacist is to continually decrease the number of clerks, while increasing the number of proprietors and the number of drug stores.

Take, for example, the case of a young man who is registered as an assistant pharmacist. His certificate entitles him to perform every duty of a registered pharmacist, except to become the owner or the responsible manager of a drug store. Provided the store is under the supervision, management and control of a legally registered pharmacist, the assistant may exercise every other function of a pharmacist. He may sell drugs and poisons, compound prescriptions, and remain in charge during the temporary absence of the manager or proprietor.

The supervision by a registered pharmacist must, of course, be in good faith, and not a merely colorable supervision, such as the hanging of a pharmacist's certificate in the store, while the owner thereof gives no real attention to the business.

This assistant, having four years' experience and possessing the common impatience of the American youth to get into business for himself, takes the pharmacist's examination at the earliest possible date and becomes a full-fledged pharmacist. He can now become the owner of a store, or manage one for some relative or friend who has been attracted by the fairy tales of the enormous profits to be made out of drugs. Our newly registered pharmacist, therefore, begins to look around for an eligible corner where a new store can be established, and as soon as he can find a suitable location leaves the ranks of the assistants and becomes a proprietor. Thus he not only takes himself out of the ranks of the clerks, but as he himself is in need of an assistant, the total decrease in the available number of clerks is two.

The Subdivision of Business and the Reduction of Profits.

But our newly made proprietor, while he has increased the demand for assistants, has not increased the rate of compensation for assistants in the same ratio, but rather the reverse. By starting a new store he does not enlarge the total volume of business, but has merely divided an already slender patronage with his former employer, and instead of there being in that particular section one prosperous drug store able to pay one proprietor and assistant fairly well there are now two unprofitable stores, neither of which is able to pay either proprietor or clerk a sufficient compensation.

In case the newly made pharmacist buys an old store instead of starting a new one, while he does not divide the business he does, nevertheless, increase the scarcity of clerks.

Thus it is evident that the pharmacy laws as at present constituted, without the requirement of a probationary period as registered assistant, have for many years operated as an endless chain to increase the number of proprietors and to decrease the available number of assistants.

If this process had the merit of increasing the compensation of assistants while it lessened the supply we might console ourselves with the thought that a very worthy class of men were receiving benefits, but, unfortunately, like the traditional ill wind it brings good to no one, since the multiplication of stores and the subdivision of business compels a meager profit for the employer and a still more slender salary for the employee.

The Remedies Proposed.

One remedy proposed is that the states should universally adopt amendments which will permit licentiates of one state to register in any other state without examination. Such a change in the laws, while highly desirable for many other reasons, would afford only partial and temporary relief, since the scarcity is nearly as great in one state as in another.

Another and far less meritorious proposition is to repeal the pharmacy laws so far as they require the examination and registration of assistants, and to permit every pharmacist to be the sole judge of the qualifications which he shall demand of his assistants. This is an impossible proposition, and its adoption would soon be followed by the repeal of all registration laws, and the last state of pharmacy would be worse than the first.

In the writer's opinion, a far more rational proposition than either of these, and one which promises a more certain and permanent relief, is to so amend the pharmacy laws that they will not continue to operate, as they do now, to drain the clerk market and crowd the supply of stores. The amendment is very simple, viz., to require all candidates to first register as assistants and to remain on the roll as such for a period of from three to five years befor they may apply for registration as pharmacist, leaving the period of experience required for assistants as it is at present, two years.

Such a change in the laws would operate beneficially in several ways:—

It would in time increase the number of men available for assistants, and also gradually decrease the number of those who are seeking assistants.

It would have the effect, more important from a public standpoint, of insuring the enforcement of a proper period of experience before young men are permitted to engage in the hazardous business of supplying the public with medicines and poisons.

Probably every member of a State Board of Pharmacy will admit that he is morally certain that at nearly every examination young men are admitted to the register who are deficient in experience, but, as they present certificates from real or pretended employers which assert that the applicant has had the necessary experience, the Board is helpless to prevent their registration.

The proper way, and in fact the only way, to prevent the presentation of fraudulent certificates, and to insure that every applicant shall have had a proper period of experience, is to have him on the official register for the full period of time prescribed by the law.

Probably some of those who are now anxious to speedily register as pharmacists would object to any increase in the experience requirement, but such an objection cannot stand in the face of the great interest of the public in properly qualified dispensers of drugs and medicines, not to mention the interest of the whole pharmaceutical establishment in the benefits which would gradually follow upon such a change.

The assitants, while they might be temporarily discommoded by their long wait, would be more than compensated therefor by the increase in salaries which employers would be able to pay by reason of improved business, and when eventually admitted to the rank of pharmacist they would be entering upon a calling not done to death by over competition.

◆

Notes on Certain Reactions of the Cinchona Alkaloids.

By *A. B. Lyons.*

The text-books on pharmaceutical chemistry give very meagre information regarding the behavior of the salts of the several Cinchona alkaloids towards the more common organic acid radicles. The statement that was recently published in a pharmaceutical journal that there exists an incompatibility between quinine sulphate and ammonium acetate has induced me to make a series of experiments, the results of which should interest every pharmacist.

The plan of experimentation was a very simple one. One gram of quinine sulphate was dissolved in fifty cubic centimeters of water with addition of 2.5 cc. of five percent sulphuric acid. Similar solutions were made of the sulphates of quinidine, cinchonidine and cinchonine. The ordinary commercial sulphates of the alkaloids were used, and no attempt was made to make the solutions correspond accurately in alkaloid content. In each the same quantity of sulphuric acid was used, sufficient in each case to give a strong acid reaction with litmus paper.

Ammonium Acetate.

A solution of ammonium acetate was prepared by mixing equal volumes of official acetic acid and water of ammonia, the former being chemically in excess. When 1 cc. of this strong solution was mixed with 1 cc. of the quinine solution, crystals formed almost immediately so that the mixture became semi-solid. When 1 cc. of the ammonium acetate solution was diluted with an equal volume of water, and 1 cc. of the quinine solution was added, crystallization began very soon and proceeded rapidly. The addition of a little more sulphuric acid did not dissolve the crystals, although they disappeared when a larger quantity was added. Addition of 1 cc. of alcohol in place of the acid caused immediate solution of the crystals. When 2 cc. of water was added instead of one, the formation of crystals did not begin until after the mixture had been shaken vigorously for a minute or more. The crystalline deposit (slender acicular crystals like those of quinine sulphate) was moreover not very abundant. If 2 cc. of the ammonium acetate solution and 1 cc. of acetate was used, crystals formed more rapidly and were fairly abundant.

When 1 cc. of the solution was mixed with 1 cc. of solution of cinchonidine sulphate, crystals appeared only after prolonged vigorous shaking, and then not numerous. If 2 cc. of the saline solution was used, crystallization occurred more quickly. Solutions of quinidine and cinchonine sulphates gave no reaction.

These observations are of interest, especially in connection with the suggestion to use ammonium acetate in preference to sodium citrate in making elixirs containing ferric phosphate or pyrophosphate. The alcohol present in such elixirs would remove all danger of any precipitation of quinine even if the elixir contained as much as a grain of the sulphate to each fluidrachm.

Ammonium Citrate.

A solution of ammonium citrate containing about ten percent of the salt, with a distinct excess of acid, was used in the next series of experiments Four experiments were made, in which 1 cc. of the quinine solution was added to 1 cc. of the ammonium citrate solution to which had been previously added 1, 3, 5 and 8 cc. resp. of water. In the first case a heavy precipitate was thrown down almost immediately. Addition of 1 cc. of alcohol only partially cleared the solution; 2 cc. rendered it quite transparent. In the second case the precipitate was more tardy in forming, but was sufficient in amount to render the fluid quite thick. In the third, crystals appeared only after shaking the mixture, but soon filled the whole fluid. The addition of 2 cc. of alcohol rendered the solution nearly clear. In the last, the crystals appeared only after rather prolonged shaking, although ultimately abundant in amount.

In all cases, addition of a few drops of five percent sulphuric acid had no apparent effect, but the crystals dissolved when any considerable quantity of the acid was added.

It was noticeable that when this or almost any other of the saline solutions experimented with was added to the highly fluorescent solution of quinine bisulphate, the fluorescence was immediately quenched. It is plain that even in preparations containing a considerable proportion of alcohol, a decided incompatibility exists between alkaline citrates and salts of quinine. It is this incompatibility that forms one of the chief difficulties in making permanent elixirs of the phosphates of iron and quinine, where the quantity of the latter exceeds half a grain to the drachm.

The other alkaloids of the cinchona bark, with the single exception of cinchonidine, do not exhibit this incompatibility. There was no precipitation or sign of crystallization when equal volumes of the ammonum citrate solution and the solutions of quinidine or cinchonine were mixed,even after prolonged violent agitation. Cinchonidine shows the incompatibility, but in a much smaller degree than quinine. When equal volumes of the solutions of cinchonidine sulphate and of ammonium citrate were mixed, a crystalline precipitate began to appear after some time, becoming at length fairly abundant. Addition of 1 cc. of aclohol rendered the solution nearly clear. When 2 cc. of water was appeared until the end of an hour, although the mixture was frequently shaken vigorously in the meanwhile.

Rochelle Salt.

That quinine and cinchonidine are precipitated from neutral solutions by tartrates of the alkalies is a fact commonly known, as is the antithetical fact that solutions of quinidine and of cinchonine are not so precipitated.

The following experiments with acid solutions of the cinchona alkaloids are nevertheless not without interest. The same plan was adopted as in the experiments with ammonium citrate. 1 cc. of a 10 percent solution of Rochelle salt was diluted with varying proportions of water and then 1 cc. of the quinine or cinchonidine solution added.

In the experiments with quinine, precipitation of apparently amorphous tartrate took place in solutions to which had been added only 2 or 3 cc. of water, but when 8 cc. of water was added, precipitation did not take place at once, and was evidently quite incomplete. The crystals which formed were very small and were not in the form of slender needles as in the case of the citrate. With 12 cc. of water no crystals formed within 20 minutes, the solution being meanwhile repeatedly shaken. The precipitate was much less soluble in alcohol than that of the citrate. It was also somewhat less soluble in acids. Eight or ten drops of a 5 percent sulphuric acid solution generally sufficed, however, to dissolve the precipitate formed from 1 cc. of the alkaloidal solution, whatever its concentration.

Cinchonidine tartrate proved to be distinctly less soluble in water or in alcohol than the quinine salt. Solutions containing 12 cc. of water showed crystals very soon; even with 15 cc. of water the crystals appeared within 15 minutes.

While quinine, therefore, is scarcely precipitated as tartrate from a somewhat acid solution containing 0.17 percent of alkaloid, cinchonidine shows some precipitation when the strength is only 0.12 percent.

Ammonium Oxalate.

Quinine is sharply contrasted with the other cinchona alkaloids in its behavior towards oxalates. The acid solutions of quinidine, cinchonidine and cinchonine are not precipitated by ammonium oxalate. Proceeding as in the foregoing experiments, I found that when 8 cc. of water was added to the oxalate solution, the separation of quinine oxalate on adding the quinine solution was slow, but the deposit was abundant. Even when 20 cc. of water had been added, crystals began to form after a short time, the solution having been shaken to promote crystallization. The practical limit seemed to be reached thus when the solution contained about 0.07 percent of quinine. In several experiments, the residual quinine in 10 cc. of the mother-liquor from which the quinine oxalate had been removed amounted to between 2 and 3 milligrams. In similar experiments with solutions from which the quinine had been precipitated with Rochelle salt, the residual alkaloid was 6 or 7 milligrams. From strictly neutral solutions, no doubt, the alkaloid is much more completely removed.

Sodium Salicylate.

The salicylates of the several cinchona alkaloids are only sparingly soluble in water, but dissolve readily in weak alcohol. When a solution of one of the alkaloids is mixed with a solution of sodium salicylate, a precipitate is thrown down which is not distinctly crystalline, and which assumes a curdled appearance, the particles aggregating into sticky masses.

In experiments similar to those previously described, abundant precipitation occurred in the case of quinine and quinidine when 6 cc. of water had been added to the 1 cc. solution of sodium salicylate (10 percent), the mixture becoming clear on adding 1 cc. of alcohol. About an equal amount of precipitate was thrown down by solutions of cinchonine and of cinchonidine sulphates when 4 cc. of water had been added to the salicylate solution, a somewhat larger quantity of alcohol being required to redissolve the precipitate. Precipitation takes place in considerably more dilute solutions if an excess of the reagent is used.

Sodium Borate.

There is no marked incompatibility between salts of the cinchona alkaloids and borax, except such as is due to the alkalinity of the latter. When the acid solutions of the alkaloids were mixed with an equal volume of five percent borax solution, no change took place except in the case of the quinine salt, which yielded presently a fairly abundant crop of crystals. There may have been nothing more than quinine neutral sulphate, and were not formed in solutions to which an equal volume of water had been added.

Sodium Benzoate.

When 1 cc. of either of the alkaloidal solutions used in the foregoing experiments is added to 2 cc. of a five percent aqueous solution of sodium benzoate a heavy precipitate is immediately thrown down. Except in the case of quinine, addition of a little water dissolves the precipitate completely. For the quinine precipitate about 4 cc. of water suffices, but a portion of the precipitate, which has aggregated into sticky masses, fails to dissolve. For quinidine 3 cc. of water is required, for cinchonidine or cinchonine two is sufficient, but in the case of cinchonidine the solution almost immediately begins to crystallize, becoming shortly filled with acicular crystals. The addition then of 6 cc. of water fails to redissolve the crystals. The solutions containing quinidine and cinchonidine remain permanently clear; the quinine solution after a time—it may be an hour or more—throws out small warty groups of minute crystals.

If 1 cc. of the quinine acid solution is diluted with 4 cc. of water and 1 cc. of a ten percent solution of sodium benzoate is added, the mixture becomes milky, but very soon there separates a precipitate which adheres to the sides of the container, leaving the fluid clear. After a time warty groups of crystals form, adhering to the sides of the container. At a dilution of 1:8, very little precipitation takes place.

The limit of dilution for a quinidine solution is about the same as for quinine.

Cinchonine is not precipitated in solutions diluted much more than 1 : 2.

The cinchonidine solution at a dilution of 1:8 yields after shaking an abundant crystalline precipitate. At 1:10, crystals appear only after prolonged shaking; at 1:12 crystals form within half an hour, but not in abundance. The precipitates are all very readily soluble in alcohol. It is not easy to see just how soluble they are in acids, since these cause separation of benzoic acid.

Sodium Phosphate.

When 1 cc. of the acid quinine solution was mixed with 1 cc. of a five percent solution of disodium orthophosphate, the mixture first gelatinized, then crystallized. The addition of 10 cc. of water did not immediately dissolve the crystals. When the quinine solution was diluted with water 1:5 before adding the sodium phosphate, abundant crystallization took place after shaking the mixture. When the dilution was 1:7, crystals appeared only after some time. The crystalline precipitate dissolves on addition of 2 or 3 cc. of alcohol.

Solution of quinidine sulphate of the strength used in these experiments shows no reaction with sodium phosphate solution.

When 1 cc. of cinchonidine solution is added to 1 cc. of the sodium phosphate solution diluted with 2 cc. of water, crystals separate shortly in abundance. Addition of 1 cc. of alcohol does not dissolve the crystals; 2 cc. gives a clear solution. In a dilution of 1:5 there is after half an hour only a faint suggestion of crystallization. The behavior of solutions of cinchonine towards this reagent is characteristic and surprising. On mixing 1 cc. of the reagent with 1 cc. of the cinchonine solution, at first a clear solution results. From this there is slowly deposited a small crop of minute rosettes of crystals which are remarkable for their very sparing solubility in alcohol.

When the phosphate solution is rendered as nearly as possible neutral with acetic acid, it is noticeable that its effect in causing crystallization in these acid solutions is distinctly diminished, as might be expected.

Potassium Iodide.

No precipitate is produced in acid solutions of the cinchona alkaloids by a neutral solution of potassium iodide. In strictly neutral solutions of quinidine sulphate containing 0.25 percent of the alkaloid, precipitation of the crystalline iodide takes place slowly and incompletely. The other alkaloids, as is well known, are not precipitated.

Potassium Chromate.

Acid solutions of quinine are not precipitated by this reagent. In strictly neutral solutions containing 0.2 percent of the alkaloid abundant crystals form slowly. The reaction is distinctive for quinine.

Resorcin.

Acid solutions of quinine sulphate show no reaction. When a solution of resorcin is added, however, to a strong neutral solution of quinine bisulphate, the fluorescence disappears and crystals presently appear.

Laboratory Nelson, Baker & Co.

◆

The Use of Potassium Bi-Iodate for Standardizing Volumetric Solutions.*

By *Charles E. Caspari.*

It has been known for many years that potassium biiodate offers an excellent ultimate standard for volumetric solutions, but this fact does not seem to be very generally known and seems to be still less used. It is not the object of this paper to present anything new, but simply to give the experience of the author in the use of this new standard, he feeling sure that it deserves more general use than it now enjoys.

---

* **Read before the Scientific Section of the A. Ph. A. at the Kansas City meeting**

In 1860 C. V. Ibau used potassium bi-iodate for standarizing solutions of iodine, that is he used it to standardize a solution of sodium thiosulphate from which he standardized his iodine solution. In 1889 the same author published an article showing that even very dilute solutions of potassium bi-iodate can be kept unchanged for years, that they can be used for controlling the titer of solutions of iodine, potassium permanganate and sodium thiosulphate and that the salt decomposes in the presence of various acids and under different conditions of dilution according to the following equation:

$$KH(IO_3)_2 + 10KI + 11HCl = 11KCl + 6H_2O + 12I.$$

It was probably this work which caused potassium bi-iodate to be made official in the Hungarian Pharmacopœia.

In 1895 appeared an article by Meinecke in the Chemiker-Zeitung, Vol. XIX, page 2, in which he gives the results of many experiments in the use of potassium biiodate in standardizing solutions of sodium thiosulphate, iodine, potassium permanganate, silver nitrate and potassium hydrate. The accuracy of his results is marvelous. and we ordinary chemists cannot hope to attain to such accuracy in our analytical manipulations. It was this article of Meinecke's that first drew the attention of the author to this subject and led him to repeat some of the work of Meinecke with the most gratifying results. The results, to be sure, were not as close and accurate as those of Meinecke, nevertheless they justify one in concluding that potassium biiodate affords a very excellent standard for all solutions commonly used in volumetric analysis.

This salt can be purchased of a high grade of purity in the market or it can readily be prepared in the laboratory. That which the author used was prepared by himself. Potassium bicarbonate is mixed in solution with an equivalent amount of iodic acid and if the mixture is neutral, to it is added an amount of iodic acid equal to the amount first used. The solution is evaporated until crystallization begins and the first crop of crystals is rejected. The crystals which separate after the solution has cooled to 50° C. are almost pure and will be absolutely pure if recrystallized once from water. Meinecke found as the mean of three determinations that the salt bought in the market contained 100.039 percent of potassium biiodate. Hence, there is no difficulty in procuring a salt which is absolutely pure.

The first experiments made were with weighed portions of the biiodate and a solution of sodium thiosulphate which had been standardized against pure resublimed iodine. The sodium thiosulphate was found to contain 0.024536 gms. of $Na_2S_2O_3 . 5H_2O$ per c. c. as determined by titration against weighed portions of resublimed iodine. The reaction which takes place when potassium biiodate reacts with potassium iodide in the presence of an acid is expressed by the equation:

$$KH(IO_3)_2 + 10KI + 11HCl = 11KCl + 6H_2O + 12I.$$

The liberated iodine is then determined with sodium thiosulphate. 388.85 parts of potassium biiodate are equivalent to 2971.68 parts of crystallized sodium thiosulphate. The following results were obtained with the solution of sodium thiosulphate described above:

	$KH(IO_3)_2$		$Na_2S_2O_3.5H_2O$
I.	0.1996 required 62.19 c. c.	=	0.024527 per c. c.
II.	0.1543 required 48.09 c. c.	=	0.024518 per c. c.
III.	0.1327 required 41.31 c. c.	=	0.024531 per c. c.
		Mean	0.024531 per c. c.

The titer of the same solution determined with iodine was 0.024536 gms. $Na_2S_2O_3 . 5H_2O$ per c. c. Potassium biiodate is also decomposed by potassium iodide in neutral solution and in this case only 1/12 the iodine is liberated as when the decomposition takes place in acid solution. Meinecke claims that the decomposition takes place according to the following equations:

$$\text{I.}\quad 5KH(IO_3)_2 + 5KI = 10KIO_3 + 5HI.$$

$$\text{II.}\quad KH(IO_3)_2 + 5HI = KIO_3 + 3H_2O + 6I.$$

Or combining I and II:

$$\text{III.}\quad 6KH(IO_3)_2 + 5KI = 11KIO_3 + 3H_2O + 6I.$$

It is thus seen that according to this decomposition one molecule of potassium biiodate yields one atom of iodine and is hence equivalent to one molecule of sodium thiosulphate, while according to the decomposition in acid solution one molecule of the biiodate is equivalent to twelve molecules of the thiosulphate. There is one objection to the decomposition in neutral solution and that is that in order for the reaction to take place as explained above, the potassium iodide used must be absolutely neutral. It is very difficult to obtain this salt entirely free from alkali and to remove it requires both time and trouble. Of course a solution of sodium thiosulphate which has been standardized by potassium biiodate, may be used to standardize solutions of potassium permanganate, which in acid solutions liberates iodine from potassium iodide and this iodine can then be determined with the solution of thiosulphate. One molecule of permanganate liberates five atoms of iodine and is hence equivalent to five molecules of sodium thiosulphate. Solutions of potassium permanganate standardized by oxalic acid and by sodium thiosulphate which in turn had been standardized through potassium biiodate gave results which agreed with each other to within 0.1 of one percent.

A solution of silver nitrate may also be standardized by means of potassium biiodate. It is well known that iodic acid and its salts are easily reduced by sulphurous acid or sulphites with the liberation first of iodine and with the further addition of the reducing agent, the formation of hydriodic acid or iodides. The reaction takes place so smoothly that the reduction can be effected with a minimum excess of the reducing agent, and this slight excess can be easily removed by heating the solution for a short time with a little nitric acid, thus oxidizing the sulphite to sulphate. The hydriodic acid or iodide formed can be precipitated as silver iodide with an excess of silver nitrate and the excess determined by means of a solution of potassium sulphocyanide. One molecule of potassium biiodate is equivalent to two molecules of silver nitrate. This method of standardizing a solution of silver nitrate was tried by the author with the following results. A solution of silver nitrate was prepared and standardized against pure sodium chloride by the Volhard method, and the solution was found to contain 0.016827 gms. of silver nitrate per c. c. Then weighed portions of potassium biiodate were reduced with sulphurous acid, the excess of sulphurous acid oxidized by means of nitric acid and the amount of silver nitrate necessary to precipitate all the iodine as silver iodide was determined by Volhard's method. The results follow:—

$KH(IO_3)_2$ $AgNO_3$

0.8671 required 44.99 c. c. = 0.016808 gms. per c. c.

0.7524 required 39.02 c. c. = 0.016815 gms. per c. c.

0.9356 required 48.55 c. c. = 0.016804 gms. per c. c.

Mean = 0.016809 gms. per c. c.

The titer of the same solution as determined by titration against sodium chloride was found to be 0.016827 gms. per c. c.

Finally the strength of standard solutions of alkalies may be determined by means of potassium biiodate, which is an acid salt, phenolphthalein being the indicator used. The author made use of a solution of potassium hydrate, whose strength had been accurately determined by means of oxalic acid. In this way the solution was found to contain 0.005487 gms. of potassium hydrate per c. c. One molecule of the biiodate is equivalent to one molecule of potassium hydrate, or 388.85 parts of the biiodate are equivalent to 55.99 parts of potassium hydrate. Weighed portions of the biiodate were dissolved in water and titrated with the solution of potassium hydrate, using phenolphthalein as an indicator. The results follow:

$KH(IO_3)_2$			KOH
1.8723	required 49.18 c. c.	=	0.005482 gms. per c. c.
1.8946	required 49.80 c. c.	=	0.005478 gms. per c. c.
1.7392	required 45.67 c. c.	=	0.005483 gms. per c. c.
	Mean	=	0.005481 gms. per c. c.

The titer of the same solution of potassium hydrate found by means of oxalic acid was 0.005487 gms. per c. c.

The results recorded in this paper seem to show conclusively that potassium biiodate is particularly well adapted for standardizing solutions of sodium thiosulphate, and through it solutions of iodine and potassium permanganate, of silver nitrate, of the alkalies and through them of the acids. The results obtained by Meinecke agree much more closely than those of the author, but still those recorded here are very satisfactory.

It will be noticed that considering tenth normal solutions in standardizing solutions of sodium thiosulphate and silver nitrate, relatively small amounts of potassium biiodate are required by 50 c. c. of solution, while in the case of potassium hydrate a large amount is required for 50 c. c. of solution and hence in the former case a small error in weighing off the biiodate would entail a relatively large error in the results. For this reason it is best to use the potassium biiodate in the form of a solution of known strength, say tenth normal, when the difficulty will be obviated. It has been tried and found that solutions of potassium biiodate which have been preserved for two years in tightly stoppered bottles have lost only 0.04 percent in strength.

This salt then can be used for standardizing all the volumetric solutions commonly found in a laboratory and these in turn can be checked against each other, thus proving them to be correct. It does away with the necessity of preparing resublimed, dry iodine, c. p. oxalic acid of the composition $C_2H_2O_4 . 2H_2O$ and with the method of standardizing potassium permanganate by means of iron wire. Further advantages in the use of potassium biiodate are that it is easily procured in an absolutely pure state, it contains no water of crystallization and is neither deliquescent nor efflorescent, and it can be thoroughly dried at 110° C. without fear of decomposition.

In view of these numerous advantages it seems strange that the salt does not enjoy more general use, unless it be because chemists in general are not familiar with it. On this account only has this paper been presented and it is hoped that those who are interested will give it a trial as opportunity offers. The author will be only too glad to discuss any points in detail with those who desire to make a trial of the salt.

Laboratory Meyer Bros. Drug Co., St. Louis, Mo.

◆

Balsam Copaiba.*

By *A. R. L. Dohme* and *H. Engelhardt.*

It is a difficult matter to endeavor to establish a standard or to settle upon some basis upon which to work out the condition of the market in the case of a substance like Copaiba. There is no definite knowledge as to just what plants it is obtained from, and its native land is about as variable as its physical condition, when reaching this country. Being such a bohemian in its habits, it is hardly fair to expect much of Balsam Copaiba in the way of uniformity or purity. It does, however, fully live up to its reputation, and we are inclined to agree with Gehe & Co. and Caesar & Loretz, two of the leading German wholesale drug houses and importers, that nearly all the Copaiba offered for sale, or, for that matter, imported, is adultered, usually with rosin. Whether this is done by the gatherers,

---

* Read before the Scientific Section of the A. Ph. A at its meeting at Kansas City.

or the shippers or by the importers, it is difficult to say. It is natural to expect that a product that varies so in its habitat and its physical and chemical properties, is a fruitful field for sophistication. Did it ever occur to any of you, how very few pharmacists ever test the goods they buy, and to what an enormous extent they are dependent upon the honesty and integrity of the jobber, not merely for the purity of their goods but as well their identity? The Pharmacopoeia gives the descriptions and the tests to identify the goods and their impurities, but the pharmacist says "Surely my jobber would not send me an impure article; I'll take it for granted that it is pure." Let me tell you right here that there are jobbers who are shrewd enough to know this condition of mind of the retailer, and, taking their chances of being caught, send out adulterated goods. Even among the jobbers who are lauded as model jobbers and do a large business, may be found some who play their very reputation for all it is worth in the adulterating line. As we do considerable testing, we know that adulteration is carried on, and in Copaiba in particular, we found some evidences of it. Numerous methods to detect the adulterations of Copaiba, consisting chiefly of rosin, Gurjun balsam, paraffin, turpentine and fixed oils, have been suggested and tried, but most of them have proved unreliable. Balsam Copaiba is a solution of acid and neutral resins in a volatile oil. From the resin, several acids have been isolated, viz: (1) Copaibic Acid ($C_{20}H_{30}O_2$) by Schweitzer, a crystalline body with the melting point 131° C. (2) Oxycopaibic Acid ($C_{20}H_{28}O_3$) by Fehling; melting point 120° C. (3) Metacopaibic Acid ($C_{22}H_{34}O_4$) by Strauss from Maracaibo balsam, melting point 205—206° C. H. Mach found later on that this body was a cholesterin-like compound of the formula $C_{15}H_{23}OH$. Several more acids were isolated by Tschirch in 1899, differing from the just mentioned in properties and composition. The volatile oil is a colorless or light yellow strongly laevogyrate liquid with a peculiar odor and an aromatic taste, sp. gr. 0.90—0.91. Wallach found that it consists chiefly of Caryophyllene, a sesquiterpene with the formula $C_{15}H_{22}$. Up to the present time, it has not been definitely decided whether the oil or the resin has the greater therapeutic value, although the preponderance of opinion seems to lean toward the resin being the more active. The specific gravity depends upon the amount of resin dissolved in the volatile oil. The Brazilian or Para balsams have a low specific gravity, and the percentage of resin seldom exceeds fifty percent. The balsams from northern South America and the West Indies have a higher specific gravity, and, consequently, a higher percentage of resin. The balsam of the East Indies (Gurjun Balsam or Balsam Dipterocarpi), and from West Africa (Illurin Balsam) have a high specific gravity but a proportionately low percentage of resin. The following samples of balsams were examined, and of these the first six were Brazilian balsams, or were labelled as such. They were all bought in the open market from the various leading sources of Copaiba balsam in this country:

		Sp. gr.
I	*Para*, light brownish color, oily, not fluorescent	0.950
II	*Para*, light brownish color, semi-viscid, not fluorescent	0.975
III	*Para*, light brownish color, oily to semi-viscid, not fluorescent	0.962
IV	*Para*, light yellowish color, oily, not fluorescent	0.935
V	*Para*, light brown color, semi-viscid, slightly fluorescent	0.966
VI	*Para*, yellowish color, oily, not fluorescent	0.923

Dieterich* in numerous estimations found that Para balsam possessed the specific gravity 0.95—0.97, which would agree well with I, II, III and V, and Gehe & Co.† found that large quantities of light Para balsam with a specific gravity 0.930 and lower are imported and used for manufacturing the balsams of a higher specific gravity by mixing them with rosin. These light Para balsams are represented by IV and VI. Umney‡ gives the specific gravity for two Brazilian balsams — 0.938 for Bahia and 0.920 for Para.

		Sp. gr.
VII	*Maracaibo*, semi-viscid, yellowish brown, slightly fluorescent	0.983

Umney found 0.963, Dieterich 0.980—0.990 for Maracaibo balsam.

VIII	*Angostura*, almost viscid, light brown, slightly fluorescent	0.991

Praël found sp. gr. 0.981—1.004.

IX	*Maranham*, light brownish, oily to semi-viscid, not fluorescent	0.976

Umney found sp. gr. 0.990.

---

* Helfenberg Ann. 1897.
† Geschäftsberichte and Pharm. Centralb. 1899.
‡ Pharm. Journ. 1901, page 324.

X *Central American*, light brown, oily, not fluorescent 0.976
XI *African*, brown, viscid, fluorescent 0.966
XII *African*, same as XI.
Gehe & Co. found sp. gr. 0.990.

A sample of gurjun balsam obtained was a light brown-colored, oily liquid, strongly fluorescent, and had a spec. grav. of 0.960. Dieterich found its gravity to be 0.958—0.964.

The specific gravity of Balsam Copaiba, as given in the different pharmacopoeias, differs very much. The Br. Pharm. gives the spec. gr. 0.916—0.993, allowing therefore a balsam with less than 20% of resin, or, in other words, ascribing very little therapeutic value to the resin. The U. S. P. gives a low spec. gr. also, 0.940—0.990, while the German and Swiss Ph. prefer the heavy thick balsams, with 50% and more of resin, giving spec. gr. 0.960—0.990, or not less than 0.960.

Examination for adulterations.

Gurjun balsam. This balsam possesses little therapeutic value, consequently is cheaper in price, and is frequently used as an adulterant of Balsam Copaiba. In fact, it shares with rosin the place of chief adulterant. Copaiba is generally described as not fluorescing, inasmuch as it is assumed that the fluorescence would indicate an adulteration with gurjun balsam. This view, however, has been contradicted recently, for some strictly genuine balsams that were obtained from the trees by trustworthy hands have shown decided fluorescence. The methods for detecting gurjun balsam were applied as follows:

(1) Add 2 to 4 drops of the balsam to 1 or 2 c. c. of a solution of 1 gm. pure sulphuric acid in 25 gm. of pure acetic acid. No red or violet color should be produced. Pure Copaiba gives only a yellow or pale brownish color.

A pink color was produced by balsams XI and XII only, a faint pink color by balsam II + 10% gurjun; and a distinct pink color by balsam II + 20% gurjun. This reaction shows an adulteration of 15% or more of gurjun.

(2) Shake the balsam with 3 to 4 volumes of water, filter through a wetted filter and mix the filtrate with an equal volume of HCl (1.12). No red color should be produced within 15 minutes. Balsam IV, VII and VIII gave a faint pink color. VI and balsam II

+10% gurjun a decided pink color. This reaction shows the presence of less than 10% gurjun balsam.

(3) Add 4 drops of pure nitric acid (1.42) to 1 c. c. of glacial acetic acid in a test tube, mix well, and then pour carefully on top of the liquid 4 drops of balsam. In presence of gurjun balsam, a reddish zone will be observed within a few minutes between the balsam and the acid. On shaking, the whole liquid assumes a reddish or purplish color. By this test, all the balsams showed a more or less pink color; the deepest color appeared with VI, VIII, XI and XII and the balsam mixed with gurjun. This is the most delicate reaction and shows a very small percentage of gurjun.

(4) To a mixture of 4 c. c. of acetic ether and 2 drops of sulphuric acid, add 6 to 8 drops of the balsam. No red color should be noticed within 15 minutes. If no distinct coloration is noticed, add a dropp of water and shake. No red-colored precipitate should be formed. All the balsams tested gave negative results by this test, and it is hence probably of no value.

(5) Boil a mixture of 1 volume of balsam, 3 volumes of alcohol, and 1 gm. of stannous chloride until solution is effected. The presence of ten or more percent. of gurjun balsam will give an intensively red color, which within 30 minutes changes to violet-blue. A distinct reaction was observed with balsam VIII and balsam II +10% gurjun. The test therefore shows 10% or more of gurjun.

(6) 1 part of Balsam Copaiba is dissolved in 19 parts of carbon disulphide and treated with a *freshly-prepared* cooled mixture of equal volumes of sulphuric acid and nitric acid. No red or violet color should appear. Slight red color appeared with I, V, VII and IX deep red color with VI, VIII, XI, XII, and the pure balsam mixed with 10% gurjun. The test, therefore, shows the presence of less than 10% of gurjun balsam.

(7) 1 part of Balsam Copaiba is shaken with 5 parts of water (50° C.). After warming on a water bath, two *clear* layers should be formed. The presence of any gurjun balsam causes an emulsion. As all the balsams stood this test, even VI, VII, VIII, XI and XII which gave strong reactions by tests 3 and 6 (No. II+10% gurjun, however, gave an emulsion), it can be concluded that all the balsams contain less than 10% of gurjun.

According to these tests, VI and VIII are very likely adulterated to some extent with gurjun balsam. Whether or not it is the case with XI and XII can not be said. The volatile oil in African balsam is

different from the oil in the other Copaibas, and may give the reactions for gurjun balsam without being adulterated with it.

Detection of Paraffin.

If 1 volume of the balsam be mixed with 3 volumes of alcohol, the mixture heated to boiling, and then allowed to stand and cool for 1 hour, no oil drops should separate. Only No. IV and VI, the two balsams with the low specific gravity, showed oil separated, and VI considerably more than IV.

Detection of fixed oils.

(1) 20 drops of the balsam are boiled for a few minutes with 1 c. c. of 20% alcoholic caustic soda solution, and, after cooling, twice the volume of ether is added. No jelly should be produced. All the balsams stood this test.

(2) The test of the U. S. P., that, when the volatile oil is driven off by heating the balsam in a flat-bottomed capsule, the residue, when cold, should be amorphous, transparent and friable, is not good for all balsams, for even IV and VI, which apparently are adulterated with paraffin, gave a rather hard residue. Kebler also found that a balsam, from which 92% of oil was driven off, left a resin which was far from being brittle. All the balsams in question gave a hard, more or less brittle residue.

Detection of turpentine.

When Copaiba is heated, it should not evolve an odor of turpentine. All the balsams answered this test.

Detection of rosin.

The most common adulterant is rosin, and, unfortunately, there is not one perfectly reliable test to detect it. The U. S. P. does not give a test for rosin. Test No. VII, as applied for detection of gurjun, may be used for detection of rosin also. When treated that way, in presence of rosin, turpentine, etc., the aqueous layer will be more or less turbid. With exception of VIII, IX, XI and XII, which gave very cloudy solutions, all the balsams answered this test, the solutions being only opalescent or slightly turbid.

The German Pharmacopoeia proposed the following test, which, however, is not perfectly reliable either, and allows balsam with a considerable amount of rosin to escape:

Shake 1 part of the balsam with 10 parts of Ammonia. A more or less turbid mixture results, which must not within one day gelatinise or separate a jelly. No. IX and No. II + 10% rosin showed a slight gelatinization; XI and XII gelatinized at once.

In 1896,* Bosetti proposed a test, based on the fact that a genuine balsam can be mixed with 30% of rosin without gelatinizing, when shaken with ten times the amount of ammonia water, but that gelatinization takes place when the balsam is mixed with 35% or more of rosin. A balsam, therefore, which gelatinizes when mixed with 30% rosin and shaken with 10 times the amount of ammonia water, contained originally 5% rosin. This test was applied to the samples in question, and not one escaped it. In all cases except IV, XI and XII, a slight gelatinization took place,—these three forming a solid jelly. A balsam, which only slightly gelatinizes when mixed with 30% of rosin and treated as above, should be passed as acceptable, owing to the fact that a genuine balsam cannot easily be obtained on the market, but such as form a solid jelly should be rejected as inferior. Whether or not rosin is in African Balsam, cannot be said, because the volatile oil, as mentioned above, behaves differently from the oil of the other Copaibas.

Solubilities.

Kebler and other investigators found that the solubility or the insolubility of the balsams in different liquids is a rather uncertain factor. In absolute alcohol, III, VII, X, XI and XII were completely soluble; I, II, V, VI and VIII were not perfectly soluble, after some time, floccules separated from these solutions. IV only gave a strong turbidity, and yielded, after standing, a heavy flocculent precipitate. Increased adulteration with gurjun or rosin had no material effect on the solubility in absolute alcohol.

In ether and chloroform, all the balsams, including those mixed with gurjun and rosin, were completely soluble.

In petroleum ether, I, III and IX were completely soluble; almost so,—II, IV, VI, VII, VIII and X; XI and XII showed a strong turbidity, and, after some time, a heavy flocculent precipitate settled.

The balsam mixed with gurjun and rosin showed, when dissolved in petroleum ether, strong turbidity and heavy flocculent precipitate separated, increasing with the increased amount or gurjun or rosin present.

---

* Pharm. Centralhalle, 1896.

Gehe & Co. claim that the heavy balsams are not at all soluble in petroleum ether, but give a turbid solution and a heavy precipitate after standing. If this be true, an imperfect solubility of the balsam in petroleum ether does not show an adulteration with gurjun or rosin.

In carbon disulphide, all the balsams, including those mixed with rosin, were nearly completely soluble; those mixed with gurjun showed a more or less strong turbidity, and, after standing, a correspondingly large precipitate was formed in proportion to the amount of gurjun added.

Determination of Acid, Ester and Saponification Numbers.

The German Pharmacopoeia, for determining the purity of the balsam, has adopted an acid, ester, and saponification number. The acid number, or the number of mg. of caustic potash necessary to neutraiize 1 g. of the balsam, is determined in the following way: 1 gr. of the balsam is dissolved in 50 c. c. of alcohol (free of acid), and after addition of 1 c. c. phenolphtalein solution (1:100), titrated with $\frac{N}{2}$ alcoholic caustic potash. The number of c. c. of caustic potash used, multiplied by 28, gives the acid number.

To find the ester number, i. e. the number of mg. of caustic potash which is taken up by 1 g. of the balsam when heated for ½ hour with an excess of caustic potash, 20 c. c. of $\frac{N}{2}$ alcoholic caustic potash are added to the above neutral liquid, and the mixture heated for ½ hour on a water bath in a flask provided with a reflux condenser. After cooling, excess of caustic potash is titrated with $\frac{N}{2}$ HCl solution. Number of c. c. alcoholic caustic potash consumed, multiplied by 28, gives the ester number. Acid number + ester number combined gives saponification number.

It may be mentioned here that some balsams when heated with an excess of caustic potash for a longer time (1 hour), give a somewhat higher ester number, and therefore higher saponification number. Results are given with those obtained by heating for ½ hour.

Dieterich[*] proposes cold saponification, and proceeds as follows: 1 g. of the balsam is mixed with 20 c. c. of $\frac{N}{2}$ alcoholic caustic potash and 50 c. c. of petroleum ether (b. p. 60—70°) and the mixture allowed to stand in a well stoppered bottle for 24 hours. After diluting with strong alcohol, excess of caustic potash is titrated with $\frac{N}{2}$ HCl solution, using phenolphthalein as indicator. Number of c. c. of $\frac{N}{2}$ caustic potash used, multiplied by 28, gives the saponification number. By deducting from this the acid number, which has to be determined separately, the ester number is obtained.

---

[*] Loc. cit.

The following results were obtained with the different balsams:

	Heated for ½ hour.			Heated for 1 hour.			Cold saponification.		
	Acid	Ester	Sapon.	Acid	Ester	Sapon.	Acid	Ester	Sapon.
I.	52	9.3	61.3	52.2	13.5	65.8	52.3	11.4	63.7
	52.3	9.3	61.6						
II.	65.7	6.3	72.0	66	14.8	80.8	66	10.1	76.1
	65.5	6.6	72.1						
III.	67	7	74	68.3	15.3	83.6	68	8.1	76.1
	68	7	75						
IV.	24.5	9.5	34	25	15.1	40.1	25	8.1	33.1
V.	64	10.4	74.4	62.6	9.5	72.1	59.8	6.5	66.3
VI.	20.2	11.8	32	20.5	12.1	32.6	20.5	7.6	28.1
	20.6	12.4	33						

These six balsams were bought as Para balsams. Dieterich found for Para balsams an average spec. grav. 0.950—0.970. Acid number 30—60, ester number 2—8 and saponification number 30—65. These figures agree well with I, while the results are rather low in IV and VI and rather high in II, III and V. IV and VI belong to those above-mentioned light Para balsams, and show in comparison with their spec. grav. a very low acid number, due to the fact that they are adulterated with paraffin, etc.

Umney* found for Para and Bahia balsams with a low spec. grav. the following figures:

	Sp. gr.	Acid.	Ester.	Sapon.
Para	0.920	33.1	26.9	60
Bahia	0.938	33.7	15.3	49

The figures obtained in II, III and V compare well with those obtained by Dieterich with some Para and Bahia balsams.

Para	61.62	9.06	70.68
Bahia	64.25	2.6	66.85
Bahia	81.27	6.05	87.32

---

* Loc. cit.

The results obtained with the other balsams were as follows:

	Heated for ½ hour.			Heated for 1 hour.			Cold saponification		
	Acid	Ester	Sapon.	Acid	Ester	Sapon.	Acid	Ester	Sapon.
Maracaibo	77	7.6	84.6	77.2	11.8	89	79.2	3.3	82.5
	76	8.2	84.4						
Angostura	91	10.2	101.2	87.1	15.8	102.9	87.1	10.1	97.2
	87	10	97						
Maranhan	78.8	6.3	85.1	78.5	12.4	90.9	78.5	4.6	83.1
Centr. Am.	68	8.9	76.9	......	......	......	68	1.1	69.1
	69	8.7	77.7						
African I	72	7.4	79.4	71	8.9	79.9	71	5.5	76.5
African II	73	8.5	81.5	......	......	......	73	3.9	76.9
	74	8.2	82.2						

Dieterich and other investigators found for some of these balsams the following figures:

	Dieterich.			Umney.			Beckurts.		
	Acid	Ester	Sapon.	Acid	Ester	Sapon.	Acid	Ester	Sapon.
Maracaibo	91	7.7	98.7	50.2	12.1	62.3	......	......	......
	77	9.8	86.8						
Angostura	79	16	95	......	......	......	99.6	0.0	99.6
	83	8.4	91.4						
Maranhan	......	......	......	81.5	12.8	94.3	......	......	......
Centr. Am	49	56	105						
	62	41	103	56	28	84	88.9	0.0	88.9
	88	4	92	(if identical with Carthagena)					
African	58.7	9.6	68.3	......	......	......	......	......	......
	59.3	9.6	68.9						

All these results show that even balsams of the same origin give widely differing figures, and that it is impossible therefore to fix a limit of variation for the different kinds of balsam.

These methods therefore have been criticized very much, and are considered by many investigators as perfectly unreliable in judging the quality of a balsam. Gehe & Co. made numerous experiments which proved that a balsam with a sp. gr. 0.950—0.970, and an acid number of 40—60, as required for Para balsam, and of a sp. gr. 0.980—0.990, and an acid number of 75—85, as required by the Germ. Pharm., can easily be made of the above-mentioned light Para balsams by addition of 20% and 40% of rosin.

	Sp. gr.	Acid	Ester.	Sapon.
Para balsam genuine	0.931	30	8	38
+ 20% rosin	0.956	51	7.5	58.5
+ 40% rosin	0.982	77.7	2	79.7

~~The determination of the ester and saponification~~ number is of no importance, as these figures vary very little, and, besides, vary with the method applied to determine them.

If, therefore, the determination of the acid number is to be of any value, the absence of rosin and of gurjun also should be proven previously. Rosin increases the acid number; gurjun decreases it considerably. A balsam with a high sp. gr. and a low acid number is suspicious and very likely adulterated with gurjun.

Dieterich gives the following figures for gurjun balsam. Acid number 5—10, ester number 1—10, saponification number 10—20, which agree very well with an examined sample giving acid number 9.4, ester number 0.0 and saponification number 9.4.

The determination of the ester number is of value only when the balsam is adulterated with olive oil, or other fixed oils. In these cases, the balsams have a rather low specific gravity, but the ester number is increased considerably.

To show the increase and decrease of the acid number produced by the addition of rosin and gurjun, the following table may serve:

	Acid number.		Acid number.
Balsam II	65.5	Balsam II	65.5
+ 10% rosin	75	+ 10% gurjun	59
+ 20% rosin	86	+ 20% gurjun	55
+ 30% rosin	92.5	+ 30% gurjun	48
		+ 50% gurjun	36.7

The ester and saponification numbers varied very little and are of no importance. The following method gives somewhat more satisfactory results: A good Copaiba balsam should contain about 50% of resin, determined by heating a weighed quantity of the balsam in a flat capsule on a water bath for 48 hours to a constant weight. This residue should be light in color, transparent, and in most cases brittle. Gurjun contains only about 25% of resin and therefore a balsam with a high specific gravity and a small percentage of resin is very likely adulterated with gurjun. Besides, the resin of gurjun balsam has a low acid number, 35—40, rosin, however, has a very high acid number 157—175. Adulteration with gurjun balsam will therefore decrease, and adulteration with rosin increase the acid number of the resin considerably. The 12 balsams in question gave the following results when treated as just mentioned:

	% resin.	Acid number of resin.			% resin.	Acid number of resin.
I.	38.6	127 136	VII.	Maracaibo	51	149 155
II.	51.8	128	VIII.	Angostura	60	132 140
III.	47.7	133	IX.	Maranhan	55.9	131 137
IV.	28.9	86	X.	Central Am.	47.4 47.8	143 146
V.	46.7	131 134	XI.	African I	49.5	143
VI.	22.8	92.6	XII.	African II	49.4 50	145 146

In case of the four Para balsams I, II, III and V, the acid number is almost the same (128—136); balsams VIII and IX give similar figures, while VII, X, XI and XII give somewhat higher results. IV and VI do not agree at all, and are strongly adulterated with a neutral resin, and, as shown above, with paraffin. The latter must have a high melting point, as the residue left after removing the volatile oil, was rather hard.

Umney found the following percentage of resin and the acid numbers thereof:

	% oil.	% resin.	Acid number of resin.	Character of the resin.
Para	62.4	37.6	68.9	Very soft.
Bahia	49.7	50.3	73.1	Soft.
Maranhan	41.8	58.2	136.3	Brittle.
Maracaibo	42.5	47.5	80.3	Firm but not easily pulverized.
Carthagena	41.3	48.7	135.7	Brittle.

The figures of Para and Bahia balsam vary widely from those reported above. It is difficult to understand how Umney could obtain from balsams with the sp. gr. 0.920 and 0.937 respectively, 37.6% and 50.3% of resin. He reports that the resins were very soft, and therefore the volatile oil very likely was not removed completely. If this can be done, the acid numbers of the resin will be increased, and will come nearer to those reported above for the two light Para balsams.

Maranhan balsam and Carthagena balsam, if the latter is identical with Central American balsam, agree very well with the above balsams, as well in percentage of resin, as in the acid number of the same. In Maracaibo balsam, the percentage of resin agrees well with the balsam examined; the acid number, however, falls very low, and would give an acid number of 38.1 only for the original balsam. Whether or not this is due to an adulteration with gurjun balsam or other substances is not given in his publication. Among numerous reported assays of Maracaibo balsam, such a low acid number could not be found.

From a study of these figures and results, it is evident that it is difficult to say positively that any one kind of Copaiba is the best, because each kind varies among its own samples considerably. The German Pharmacopoeia has made only the heavy resinous Copaibas official and sets Maracaibo and Angostura Copaibas as the best. Our present Pharmacopoeia has leaned rather to the lighter Copaibas, rich in volatile oil, as the best, viz: Para and Maranham. Until some experiments are made to establish whether the volatile oil or the resin of Copaiba is the more efficient thereapeutically, it is difficult to establish a criterion of efficiency. The best that we can do in the light of our present knowledge is to not condemn any Copaiba that measures up to a medium specific gravity, and is free from adulterations, especially rosin, paraffin, fixed oils or gurjun balsam. This we can do reasonably well with tests at our command, including acid and saponification numbers, and specific tests for adulterations. The 1900 Pharmacopoeia will incorporate the most reliable of these tests, and, will establish standards of specific gravity, acid and saponification numbers, which we hope will prevent the sophistication of this substance.

Report on the Examination of Some Official Drugs.*

By *Daniel Base.*

During two months of this summer I was engaged with the examination of samples of drugs, submitted by various firms as meeting pharmacopœial requirements, as to purity and strength. The drugs were to be purchased in large quantity, and the samples represented the quality of the drugs offered. The purpose of the examination was to discover to what extent adulteration was practiced, as well as how completely or incompletely the drugs were freed from those impurities incident to manufacture and whether they were of required strength in those cases where assay methods were applicable. The majority of the samples came from four large firms, of which one was a large jobber, and among the rest of the samples, nine firms were represented, the majority of them by one or two drugs. In only a few cases were there more than one sample of the same drug. It is gratifying to note that in only two cases was adulteration practiced, namely, in powdered asafetida and oil of wintergreen. The former will not cause any surprise when it is remembered that pure asafetida in the market is an exceptional occurence. In another instance, namely, iodoform gauze, the strength found was practically half that claimed. Some of the drugs containing slight and harmless impurities, but not permitted by the present Pharmacopœia, and which therefore were not up to official requirements, would probably pass muster when tested by the 1900 Pharmacopœia, since, as I am informed, the requirements in certain instances will be less exacting than now. One hundred and fifteen samples were examined, the majority of which were satisfactory. Twenty-six samples were unsatisfactory, chiefly because of the failure on the part of the manufacturers to sufficiently purify the drugs to meet the official demands, and to a less degree because of deficiency in strength. Of the unsatisfactory samples, eleven came from one of the four firms supplying the majority of the drugs, nine from another, and three from another.

---

* Read before the Scientific Section of the A. Ph. A. at Kansas City.

The following drugs were satisfactory and no comment need be made on them:

Potassium bromide.
Sodium bromide.
Ammonium bromide.
Sodium iodide.
Potassium citrate.
Sodium carbonate.
Ammonium iodide.
Potassium iodide.
Sodium salicylate.
Ammonia water (10%).
Tincture of iodine.
Iodine resublimed.
Ammonium chloride.
Absolute alcohol.
Chloral hydrate.
Gamboge.
Flax seed, pow'd.
B-naphthol.
Cinchonidine sulphate.
Balsam of Peru.
Expressed oil of almond.
Oil of peppermint.
Oil of anise.
Oil of santal.
Oil of sweet orange.
Strychnine sulphate.
Atropine sulphate.
Cocaine hydrochlorate.
Powdered extract nux vomica (2 samples).
Aromatic spirit of ammonia.
Benzoic acid from benzoin.
Acacia, 1st. (tears).
Capsicum (powdered).
Calomel.
Ammoniated mercury.
Yellow mercurous iodide.
Red mercuric iodide.
Mercuric chloride.
Bismuth subnitrate (2 samples).
Zinc acetate.
Iron sulphate.
Boric acid.
Monsel's solution.
Ferric pyrophosphate.
Mercurial ointment.
Nitric acid (C. P.).
Oil of cloves.
Olive oil.
Menthol.
Salicin.
Acetanilide.
Phenacetin.
Antipyrine.
Quinidine sulphate.
Iodoform.
Aristol.
Quinine sulphate.
Fluid extract Belladonna root.
Codeine.
Caffeine.
Spirit nitrous ether.
Citrate iron and quinine.
Chloroform venale.
Liquid petrolatum.
Creosote (beechwood)
Black mustard.
Ceylon cinnamon (powdered).

The following drugs were satisfactory and seem to merit some comment:

Chlorinated lime — contained 38.4% available chlorine, which is much higher than is found in many specimens in the market.

Sulphuric acid (C. P.) — contained 96.24% of absolute acid. U. S. P. requires for minimum 92.5%.

Amyl nitrite — contained over 96% of nitrite. U. S. P. requires about 80%.

Hydrochloric acid — contained 36.5%. U. S. P. requires only 31.9%.

Hydrogen dioxide (3%).

a. Contained 3.58% (Permanganate method).
b. " 3.16% " "

Iron and Strychnine citrate — contained 19.2% of iron. U. S. P. requires about 16%.

Iron and Ammonium citrate (soluble)—contained 19.2% of iron. U. S. P. requires about 16%.

Iron and potassium tartrate — contained 18.12% iron. U. S. P. requires about 15%.

These iron salts seem to be a case of giving "down weight."

Formaldehyde (assayed by H_2O_2 and Alkali method).

a. 40% solution — contained 35.74% by weight or 38.88% by volume.
b. " " contained 37% by weight.
c. " " " 36.96% by weight.
d. 40% by vol. — " 37% by weight or 43.4% by volume.

Glycerin, a. b. c. All good.

Yellow and white wax (same firm) — The yellow wax had the sp. gr. 0.964 at 15° C., acid number 19.56, ester number 76.76. The white wax had the sp. gr. 0.96. It was lighter than the yellow wax, floating in alcohol in which the yellow sank. Most books and the U. S. P. give the average sp. gr. for white wax higher than the average for yellow. The "Digest of Criticisms" of the U. S. P. quotes one writer, Evers, who states that yellow wax is heavier than the white. The melting point, acid figure, saponification figure, sp. gr. and other tests showed this white wax to be pure, but, contrary to statements in hand-books, one hour's boiling was not sufficient to completely saponify the wax, in fact one and a half hour's boiling was not enough. After this period of boiling the saponification figure was 65, with three hour's boiling it was 94.08.

Quinine sulphate. — The U. S. P. test for quinidine in this salt by addition of potassium iodide, T. S., gave positive or negative results according as the "cold saturated aqueous solution" of the sulphate was prepared at ordinary temperature, or at 15° C. The present U. S. P. direction is somewhat indefinite in this test as to temperature.

Oil of lavender flowers. — This seemed to be free from adulteration but apparently was a low grade oil, as it contained 25.25% of ester, linaloyl acetate. A good oil should contain at least 34%.

The following samples were unsatisfactory:

Hydrobromic acid (dilute). — Contained considerable sulphuric acid.

Lithium bromide —Contained a good proportion of sulphate, left appreciable residue when dissolved in absolute alcohol, and contained only 92.36% lithium bromide. U. S. P. requires 98%.

Potassium hydroxide, pure in sticks. — Its solution turned dark with ammonium sulphide, and it contained 1.26% of chloride, while U. S. P. allows only 0.25%. Strength 82.84%. Official is 90%.

Sodium hydroxide, pure in sticks. — Contained 2.4% chloride. U. S. P. allows only 0.24% Strength 94%—4% more than required.

Potassium acetate.—Contained an appreciable amount of sulphate and four times as much chloride as the U. S. P. allows, namely 0.28%.

Yellow oxide of mercury. — Left residue when heated to redness, which contained iron, also was incompletely soluble in dil. nitric acid.

Red oxide of mercury. — Contained nitrate and left a residue on heating, containing iron.

Morphine sulphate. — Gave decided reddish yellow color with conc. sulphuric acid. U. S. P. allows not more than a faintly yellowish tinge. The free alkaloid, dissolved in alkali and extracted with ether, yielded an excessive residue (narcotine, codeine, etc.) while a specially purified morphine gave an insignificant film of residue. U. S. P. allows only a scarcely perceptible residue.

Muriate of morphine. — The alkaloid from one gram of the salt, extracted with ether, gave 12.3 mgm. of residue, while an equivalent amount of pure morphine, treated likewise, gave only 1.2 mgm. of residue, or one-tenth as much.

Acetate of morphine.—Was grayish-pink in color, and one gram treated as above, gave 7.3 mgm. of residue.

Zinc acetate, pure U. S. P.—Did not give a clear solution, even when heated with acetic acid. Contained an appreciable amount of sulphate and much more chloride.

Acacia, pow'd.—Did not dissolve completely. Apparently it was prepared from dirty acacia.

Asafetida, powdered.—Gave 31.06% ash. Contained calcium carbonate, and had only 45.5% soluble in alcohol.

Hydrocyanic acid, 2% solution.

a. Contained 1.53%

b. " 1.51% of HCN.

These probably were two percent when bottled but had deteriorated.

Ammonia water.—Contained 8.6% instead of 10% as required.

Purified chloroform (for anæsthesia).—Showed presence of decomposition products, and small quantity of chlorine compound reacting with silver nitrate.

Iodoform gauze, 10%.—Contained only 5.3% of its weight in iodoform.

Ether (for anæsthesia).—Left appreciable residue upon evaporation. By U. S. P. test, shrinkage when shaken with water was 3.68% of its volume, limit allowed, 1%.

Quinine sulphate.—Gave a decidedly yellow color to conc. sulphuric acid, and contained excessive amount of other cinchona alkaloids.

Antimony and Potassium tartrate.—Contained a trace of iron and Bettendorff's test gave a rather brown coloration, showing the presence of arsenic.

Mercury with chalk.—Contained appreciable amount of mercuric compound.

Glycerin.—By evaporation, left an appreciable black residue and gave a strong rancid odor when warmed with dil. sulphuric acid. It contained a trace of chlorine and reduced Fehling's solution almost immediately in the official test.

Bismuth subcarbonate.—Contained too much sodium carbonate and an appreciable amount of chlorine.

Oil of wintergreen (finest).—Did not dissolve to clear solution in warm alkali. This solution, extracted with benzine, yielded a greasy oily residue. This was not examined further because of the small quantity of the sample.

Calcined magnesia.—Aqueous extract left residue of sodium carbonate on evaporation. Solution of the oxide in dilute hydrochloric acid had a distinct yellow color, and showed considerable iron. Some sulphate was also present.

As a result of the above examination, the conclusion seems to be justified that, although there was scarcely any attempt at adulteration in the specimens tested, there certainly is need of greater care in the manufacture of some of them to free them from impurities so that they may fulfil the claims made, namely that they meet the requirements of the Pharmacopœia. Perhaps a good way to compel such improvement is for purchasers to have all articles examined and to reject such as do not meet the requirements of the Pharmacopœia; this course would be decidedly justified whenever a manufacturer or jobber agreed to furnish strictly U. S. P. articles.

The Study of Phytochemistry.[*]

By *Edward Kremers.*

In like manner, after Wöhler had effected the synthesis of urea in 1828, the distinction between organic and inorganic was not immediately dropped. Only after many other carbon compounds had been prepared from their elements, the idea of a vital force as a necessary function in the preparation of carbon compounds was discarded, however, to be revived in modified form as a neovitalistic theory at the close of the 19. century.[†]

While we should regard chemistry as a unit, it will, no doubt, always be divided and subdivided in various ways. Thus for convenience we speak of pure chemistry and applied chemistry; of general chemistry and of special chemistry such as analytical, physical, thermal, electrochemistry etc. For the sake of convenience we still speak of inorganic and organic chemistry as another mode of dividing the field. In like manner we speak of a biochemistry, and, so long as there will be a science of botany and a science of zoology, we may be expected to divide the chemical field along these lines into phytochemistry and zoochemistry.

---

[*] Continued from page 356.

[†] Read before the Scientific Section of the A. Ph. A. at Kansas City.

All of these methods of classification will prove useful if we but bear in mind the reasons for their existence and do not allow effects dictated by causes of convenience unduly to control our thoughts and actions. In other words, we should not, though it be but involuntarily, draw lines of distinction where these become detrimental to true progress. Again, we have no right to adhere to antiquated notions under the name of phytochemistry, if the study of chemistry at large has shown, these conceptions no longer to be correct and not in harmony with true progress.

With these admonitions in mind, the study of the chemistry of plants is as legitimate a limitation of human activity as ever in chemical science. With the enormous development of this science, it has become even more imperative than before; indeed, a further subdivision of the phytochemical field has become necessary for successful research.

If what has been said is true, it becomes apparent that the subject matter, with which phytochemistry deals, should be treated in accordance with the most advanced ideas of the science of chemistry at large; that e. g. it should be classified in harmony with the best methods of classification of chemistry and botany.

Viewed from a chemical point of view, a knowledge of the genetic relation of plant substances and of their occurrences in the vegetable kingdom may enable us to throw much new light on the study of the living plant and ultimately on the process of life itself. Regarded from a botanical point of view, a growing knowledge of the constituents of plants will gradually teach us what substances are of general occurance, which are characteristic of large subdivisions and which of smaller ones. Botanical classification, still largely based on morphological characteristics, will ultimately be changed, if necessary, in accordance with a better knowledge of the chemical constituents of plants.

These are some of the larger aims of plant chemistry. Incidentally the development of this branch of our science will assist the pharmacist in a better understanding of vegetable drugs and their preparations, the agriculturist will acquire a better knowledge of his crops, the technologist will have new fields of conquest opened before his eyes.

It is not with plant chemistry in its various applications, that I intend to deal with primarily, but with phytochemistry pure and simple as it were, without ignoring the fact, however, that pharmaceutical and agricultural chemistry are in turn contributing largely to the domain of plant chemistry to-day as they have done a hundred years or more ago.

In order to understand our present position it is necessary to study the past. In the study of phytochemistry this is all the more important since there linger with us so many conceptions that were once well founded in the limited knowledge of the past. In other words, while e. g. organic chemistry has outgrown many of its theories of the middle of the 19. century, phytochemistry still adheres to them in a manner that is decidedly detrimental to its best development.

* * * *

The history of plant chemistry can be classified into periods in several ways according to the point of view taken of the subjet. The following classification is suggested as a tentative one. The reasons for adopting the periods as given are stated briefly in connection with each period.

I. — From the beginning of chemical study up to the close of the 17. century, the time when the chemical subject matter was classified in accordance with the three natural kingdoms into mineral, vegetable and animal. This period comprises the first three periods of chemical history.

It is but natural that the study of plants and plant products should rest under the ban of the prevailing modes of thought and chemical theories of these periods. The first chemical period is characterized by an empirical study of natural objects and by a tendency to speculation often irrespective of observed facts. The complex phenomena of plant chemistry naturally could contribute but little to science in a period when even simple inorganic experiments failed of successful interpretation.

During the alchemistic period of chemical history, when attention was concentrated upon the attempt to convert the baser metals into nobler ones, no material progress in plant chemistry could be expected. Neither could the iatrochemical school, which opposed galenical medicine and pharmacy, contribute much to the chemical study of plants.

(*To be continued.*)

Concentrated Nitrous Ether.

We manufacture a very superior article for the extemporaneous preparation of Sweet Spirit of Niter. 1 part of our Conc. Ether to 21 parts of Alcohol will produce a Spirit of Nitrous Ether answering the requirements of the U. S. P.

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopœia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street **111 Fifth Avenue**
PHILADELPHIA **NEW YORK**

LIVERPOOL, England.

To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. PRICE, 77 Lord Street, Liverpool, England.

BLOCKI'S

IDEAL Perfumes IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High Grade Guaranteed Bicycles.

New 1903 Models

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High Grade	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

Any other make or model you want at one-third usual price. Choice of any standard tires and best equipment on all our bicycles. *Strongest guarantee.*

We ***SHIP ON APPROVAL*** C. O. D. to any one *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels **$3 to $8**

taken in trade by our Chicago retail stores, all makes and models, good as new............

ESTAB-
LISHED
12 YEARS

DO NOT BUY a bicycle until you have writen for our FACTORY PRICES AND FREE TRIAL OFFER.

Tires, equipment, sundries and sporting goods of all kinds, at half regular price, in our big free sundry catalog. Contains a world of useful information. Write for it.

J. L. MEAD CYCLE CO., Chicago, Ill.

The Open Court

AN ILLUSTRATED MONTHLY MAGAZINE

Devoted to the Science of Religion, The Religion of Science and the Extension of the Religious Parliament Idea.

10 cents per copy - - - - - - $1.00 per year

SCIENCE is slowly but surely transforming the world. Science is knowledge verified; it is Truth proved; and Truth will always conquer in the end. The power of Science is irresistible. Science is the still small voice; it is not profane, it is sacred; it is not human, it is superhuman; Science is a divine revelation.

Convinced of the religious significance of Science, *The Open Court* believes that there is a holiness in scientific truth which is not as yet recognized in its full significance either by scientists or religious leaders. The scientific spirit, if it but be a genuine devotion to Truth, contains a remedy for many ills; it leads the way of conservative progress and comes not to destroy but to fulfil.

The Open Court on the one hand is devoted to the *Science of Religion*; it investigates the religious problems in the domain of philosophy, psychology, and history; and on the other hand advocates the *Religion of Science*. It believes that Science can work out a reform within the Churches that will preserve of religion all that is true, and good, and wholesome. Sample copies of *The Open Court* sent on request together with illustrated catalogue of important publications for the Study of Religion. Published by

THE OPEN COURT PUBLISHING COMPANY, 324 Dearborn St., Chicago.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical apparatus.**

NEW NOVELS.

Title		Price
The day of the dog, by George Barr McCutcheon. (Dodd, Mead)		$1.25
Sir Mortimer, by Mary Johnston. (Harpers)		1.50
My Mamie Rose, by Owen Kildare. (Baker & Taylor)	Net	1.50
Tillie, a Mennonite maid, by H. R. Martin. (Century)		1.50
The crossing, by Winston Churchill. (Mac Millan Co.)		1.50
The seiners, by James B. Connolly. (Chas. Sribner's Sons)		1.50
Evelyn Byrd, by George C. Eggleston. (Lothrop)		1.50
Brave hearts, by W. A. Fraser. (Chas. Scribner's Sons)		1.50
The Barrier, by Allen French. (Doubleday, Page & Co.)		1.50
The light of the star, by Hamlin Garland. (Harpers)		1.50
The singular Miss Smith, by Florence Morse Kingsley. (MacMillan)		1.25
The faith of men and other stories, by Jack London. (McClure, Phillips)		1.50
By snare of love, by Arthur W. Marchmont. (Stokes)		1.50
Bruvver Jim's baby, by Philip V. Mighels. (Harpers)		1.50
The Villa Claudia, by John A. Mitchell. (Life)		1.50
Anna the adventuress, by E. Phillips Oppenheim. (Little, Brown)		1.50
Bred in the bone, by Thos. Nelson Page. (Chas. Scribner's Sons)		1.50
The cost, by David Graham Phillips. (Bobbs-Merrill Co.)		1.50
The flame-gatherers, by Margaret Horton Potter. (MacMillan)		1.50
The by-ways of Braithe, by Frances Powell. (Chas. Scribner's Sons)		1.50
Fort Amity, by A. T. Quiller-Couch. (Chas. Scribner's Sons)		1.50
The castaway, by Hallie Erminie Rives. (Bobbs-Merrill)	Net	1.00
The bright face of danger, by Robert Neilson Stephens. (Page)		1.50
A gingham rose, by Alice Woods Ullman. (Bobbs-Merrill)		1.50
The descent of man, and other stories, by Edith Wharton. (Chas. Scribner's Sons)		1.50
Kings and Queens I have known, by Helene Vacaresco. (Harpers)	Net	2.00
The Republican Party, by Francis Curtis. 2 vols. (Putnams)	Net	6.00
Human work, by Charlotte Perkins Gilman. (McClure, Phillips)	Net	1.50
Working with the hands, by Booker T. Washington. (Doubleday, Page)	Net	1.50
Addresses and Presidential messages, by Theodore Roosevelt. (Putnams)		1.25
New Hampshire, by Frank B. Sanborn. (Houghton, Mifflin)	Net	1.10
The mystic mid-region; the deserts of the Southwest, by Arthur J. Burdick. (Putnams)	Net	2.00
Whittier-land, by Samuel T. Packard. (Houghton, Mifflin)	Net	1.00
Olive Latham, by E. L. Voynich. (Lippincotts)		1.50
The woman errant, by the author of "The garden of a commuter's wife." (MacMillan)		1.50
The grafters, by Francis Lynde. (Bobbs-Merrill)		1.50
The second Mrs. Jim, by Stephen Conrad. (Page)		1.00
The givers, by Mary E. Wilkins Freeman. (Harpers)		1.25
In search of the unknown, by Robert W. Chambers. (Harper)		1.50
A Texas matchmaker, by Andy Adams. (Houghton, Mifflin)		1.50
Later adventures of Wee McGregor, by J. J. Bell. (Harper)		1.25
The daughters of desperation, by Hildegarde Brooks. (McClure, Phillips)		1.25
The queen's quair, by Maurice Hewlett. (MacMillan)		1.50
The Merry Ann, by S. Merwin. (MacMillan)		1.50
Saïd, the fisherman, by M. Pickthall. (McClure, Phillips)		1.50
Order No. 11, by C. A. Stanley. (Century)		1.50
A woman's will, by Anna Warner. (Little, Brown)		1.50
The rainbow chasers, by J. H. Whitson. (Little, Brown)		1.50
The Test, by M. T. Wright. (Scribners)		1.50
Sally of Missouri, by R. E. Young. (McClure, Phillips)		1.50
Uncle Mac's Nebrasky, by W. R. Lighton. (Holt)		1.25
The shame of the cities, by Lincoln Steffens. (McClure, Phillips)	Net	1.20
By the fireside, by Chas. Wagner. (McClure, Phillips)	Net	1.00
Nancy Stair, by Elnior M. Lane. (Appletons)		1.50
Nature's comedian, by W. E. Norris. (Appletons)		1.50
My li'l' Angelo, by Anna Y. Condict. (Appletons)		1.25
Man and Superman, by G. Bernard Shaw. (Brentanos)	Net	1.25
Elizabeth's adventures in Rügen. (MacMillan)		1.50
The Penobscot man, by Fannie H. Eckstorm. (Houghton, Mifflin)		1.50
The great adventurer, by Robert Shackelton. (Doubleday, Page)		1.50
Bird center cartoons, by John T. McCutcheon. (McClure)	Net	1.25
The highroad, being the autobiography of an ambitious mother. (Stone)		1.50
The issue, by George Morgan. (Lippincotts)		1.25
The double garden, by Maurice Maeterlink. (Dodd, Mead)	Net	1.40

BAEDEKER'S GUIDE BOOKS.

Illustrated with numerous Maps, Plans, Panoramas and Views.

12 mo., cloth flexible. Prices are net.

Title	Price
The United States. With an Excursion into Mexico. (New Edition)	$3.60
Canada. (New Edition)	1.50
Austria	2.40
Eastern Alps	3.00
Egypt	4.50
France (Northern)	2.10
Germany (Northern)	2.40
Germany (Southern)	1.80
Great Britain	3.00
Greece	2.40
Italy, Northern	2.40
Italy, Central, and Rome	2.25
Italy, Southern, and Sicily	1.80
London and its Environs	1.80
Norway, Sweden, and Denmark	2.40
Palestine and Syria	3.60
Paris and its Environs	1.80
Rhine	2.10
Switzerland	2.40

Postage additional about 10%.

Title	Price
Stedman, Complete Pocket-Guide to Europe. Flexible Leather, postpaid	$1.50

GRANT ALLEN'S HISTORICAL GUIDES.

Title	Price
Paris, by Grant Allen	$1.25
Florence, by Grant Allen	1.25
Cities of Belgium, by Grant Allen	1.25
Venice, by Grant Allen	1.25
Cities of Northern Italy, by G. C. Williamson	1.25
Umbrian Towns, by Mr. & Mrs. J. W. Cruickstank	1.25

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,

MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

EXTRACT OF BEEF
MADE ACCORDING TO PROCESS OF
PROF. JUSTUS VON LIEBIG.
FROM FRESH BEEF OF PRIME QUALITY
GUARANTEED PURE.
A quarter of a teaspoonful dissolved in a cup of boiling water produces instantly a strong beef tea or bouillon of excellent flavor
Add a little salt, or celery salt
MANUFACTURED BY URUGUAY BEEF CO. GENERAL OFFICES HAMBURG, GERMANY
SOLE AGENTS FOR THE UNITED STATES OF AMERICA LEHN & FINK NEW YORK
MADE IN URUGUAY

Uruguay Beef Extract

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or domestic. Besides possessing all the stimulating and nutritive properties of a high grade Beef Extract, it is sold at a price which allows dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.
Sole Importers.

FORMIN. Hexamethylene-tetramine Merck. Presents this ideal urinary antiseptic in its highest obtainable purity. In powder form, or *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectant. Used the world over. Beware of imitations, which are poisonous and at the same time possess less disinfectant power. See that the signature of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable that the real virtues of cod-liver oil reside in an active principle or principles. Gaduol is the alcoholic extract of the active principles of cod-liver oil. It produces a stimulant and alterative effect on the processes of nutrition and absorption, and does not disturb the appetite or affect the stomach. A wine of cod-liver oil prepared from Gaduol is a favorite tonic and has a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of many babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK.

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS
WITH THE CO-OPERATION OF

Prof. J. H. **Beal**, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. **Chas. Caspari Jr.**, Professor of Pharmacy, Maryland College of Pharmacy.
Prof. **Virgil Coblentz**, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. **Fischer**, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. **Kraemer**, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. **Lloyd**, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. **Lyons**, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. **Power**, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. **Prescott**, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. **Puckner**, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. **Schlotterbeck**, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. **Wm. Simon**, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. **Stevens**, Professor of Pharmacy, University of Michigan.
Dr. R. H. **True**, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.

Agent for Europe: Julius Springer, Berlin.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 11. **NOVEMBER, 1904.**

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
28	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial 371

American pharmaceutical colleges and schools. By *Wilbur Scoville*. 402

On "Abietene." By *W. T. Wenzell* 408

The oxymethylanthraquinone drugs and their assay. By *A. Tschirch* 415

The cultivation of the opium poppy *Papavre Somniferum*, L., and the production of opium in the United States. By *W. O. Richtmann* 426

Historical fragments. By *Edward Kremers*... 427

HOUSE OF IDEAS

Few things have pleased us more than the remark of an old and valued customer that our house is eminently "a house of ideas," citing such instances as our pioneer work in pharmaceutical manufacturing; our introduction of non-secret preparations, Kasagra, Stearns' Wine, and other specialties; and our success as manufacturers of biologic products.

If you have any special formula work, why not send it to us and get the benefit of our 50 years' experience, our immense laboratories, and our ideas? We work along original lines, giving every account careful individual attention — and we don't charge any more for it than others charge for doing it in the old stereotyped, careless way.

A request will bring full information.

Frederick Stearns & Co.,
Manufacturing Pharmacists,
DETROIT, MICH., U. S. A.
WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

STEARNS QUALITY

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,
913-917 Cherry St.,
PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol,
Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and
Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,*
Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of
Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia
"Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine
"Schimmel & Co.", Oil Neroli "Schimmel & Co.",
Oil Rose, artificial, "Schimmel & Co."

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

ENDERMOL

neutral, bland, odorless,
stable, mollient, penetrating,

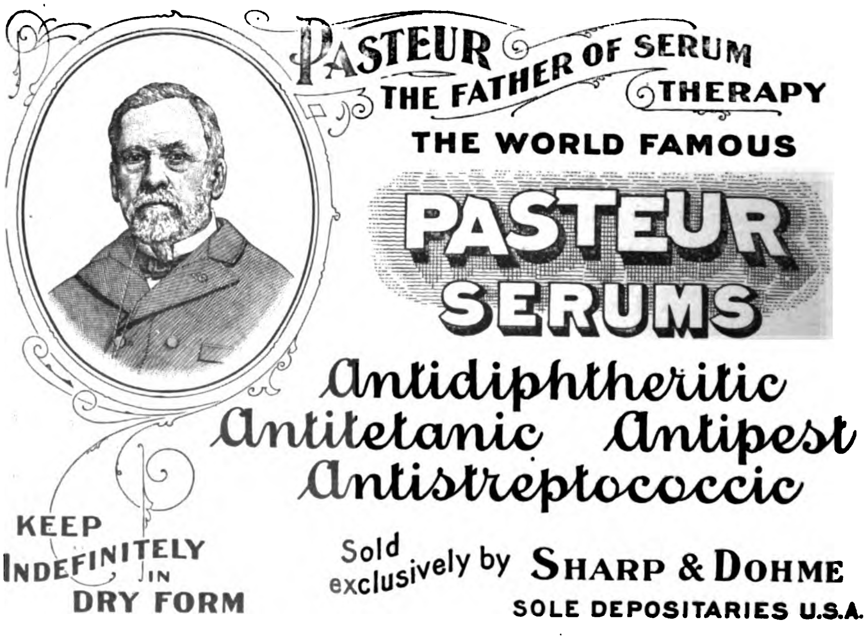
MAKES

**Smooth Ointments
with all Drugs**

1-lb. tins, 50c. per lb.
5-lb. tins, 45c. per lb.

Send for literature.

SCHERING & GLATZ,
NEW YORK.



PASTEUR THE FATHER OF SERUM THERAPY

THE WORLD FAMOUS

PASTEUR SERUMS

Antidiphtheritic
Antitetanic Antipest
Antistreptococcic

KEEP INDEFINITELY IN DRY FORM

Sold exclusively by **SHARP & DOHME**
SOLE DEPOSITARIES U.S.A.

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

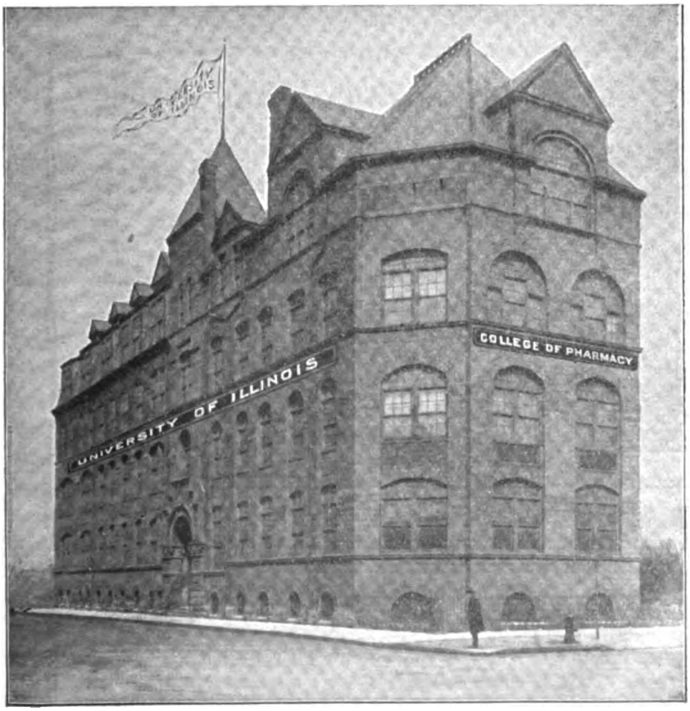
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK



University of Illinois School of Pharmacy

(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

Antidiphtheritic Serum

PEERLESS AMONG DIPHTHERIA ANTITOXINS

—IN—

PURITY, POTENCY, UNIFORMITY AND SELLING QUALITIES.

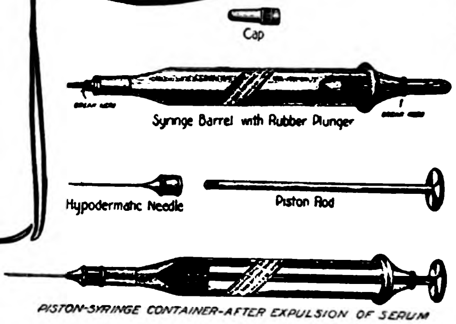
SUPPLIED IN OUR WELL-KNOWN

PISTON-SYRINGE CONTAINER

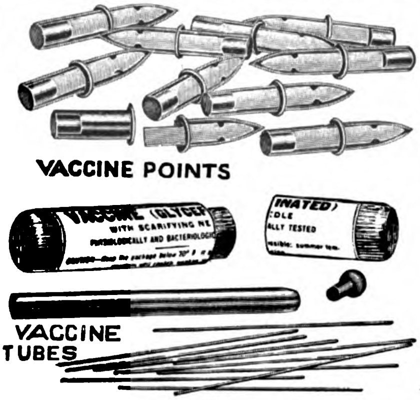
the most satisfactory "ready-to-use" serum syringe ever devised.

(Bulbs of 500, 1000, 2000, 3000 and 4000 units.)

KEEP IT IN STOCK.


Cap
Syringe Barrel with Rubber Plunger
Hypodermatic Needle
Piston Rod
PISTON-SYRINGE CONTAINER-AFTER EXPULSION OF SERUM

VACCINE



NOTHING MORE STAPLE

JUST NOW THAN

PARKE, DAVIS & CO.'S VACCINE VIRUS

the most widely used vaccine in the world.

NET PRICES

CAPILLARY GLASS TUBES (hermetically sealed), per box of ten, 60 cts.; per box of three, 20 cts.
IVORY POINTS (each in a Lee's breakable glass case), per box of ten, 60 cents.

EVERY LOT BACTERIOLOGICALLY AND PHYSIOLOGICALLY TESTED

We are the world's largest producers of Diphtheria Antitoxin and Vaccine Virus. During all the years of our work as manufacturing biologists not a single untoward result ever followed the use of our Serum or Vaccine

PARKE, DAVIS & COMPANY

LABORATORIES: Detroit, Mich., U.S.A.; Walkerville, Ont.; Hounslow, Eng.
BRANCHES: New York, Chicago, St. Louis, Boston, Baltimore, New Orleans, Kansas City, Indianapolis, Minneapolis, Memphis; London, Eng.; Montreal, Que.; Sydney, N.S.W.; St. Petersburg, Russia; Simla, India; Tokio, Japan.

Pharmaceutical Review.

VOLUME 22. NOVEMBER, 1904. NUMBER 11.

As stated in a previous number,[*] one of the lessons to be learned from the **Louisiana Purchase Exposition** is this, viz. that an international exposition of a general character is no longer the place for individual exhibits. If the "world's fair" has ceased to be a place for the advertisement of so and so's goods, if it is to be primarily of an educational character, petty jealousies of individuals and firms must give way to higher motives. The individuality of the exhibitor need not be lost entirely, but it must be subordinated to the leading motive.

As illustrations of collective exhibits that of the United States government and those by Germany have been mentioned. From the former we naturally expect that commercial considerations be excluded. The subordination of these considerations to higher educational purposes in the latter has received universal favorable comment.

Of the exhibits of a chemical nature by the United States Government those of the **Department of Agriculture** are the most extensive and also the most striking. Equally good is the collective chemical exhibit made by the agricultural experiment stations. While an account of these might prove as interesting as unquestionally it would be instructive, such a description belongs in an agricultural rather than a pharmaceutical journal. Information concerning the organization of the Bureau of Chemistry of the Department of Agriculture can be had from Circular No. 14 of this Bureau. This circular also contains a list of publications by the Bureau.

Why the **German Chemical Exhibit**[†] should have been housed in the Electricity Palace and not in the palace devoted to education does not become apparent to the visitor. The exhibit was arranged under the auspices of the "Königlich preussische Unterrichtsverwaltung" and its prime object is to trace the development of chemistry at German universities.

---

[*] Page 341.

[†] For detailed list of exhibitors and objects exhibited, see "Deutsche Unterrichts-Ausstellung in St. Louis, 1904: Chemie." Druck von W. Büxenstein, Berlin. This is a brochure of 146 pages with a good index. An English translation of it likewise can be had.

A good, illustrated account in the German language will be found in No. 36 of the "Chemiker-Zeitung," May 4, 1904.

Bearing this in mind, the reader may get some idea of the exhibit by making a mental tour through the several rooms. Not less than thirty-nine firms of chemical manufacturers, about twenty-five firms dealing with chemical apparatus and one hundred seventeen professors and docents contributed to this probably the most remarkable chemical exhibit ever made.

The visitor first enters the library and reading room. Here he finds the current numbers of German chemical journals. Chairs placed about several tables invite him to be seated and peruse the latest chemical literature at his leisure. In one of the two book cases he will find a selection of German works on chemistry: a few of rather ancient date, most of them standard modern reference works known the world over; the other contains a collection of about three thousand chemical dissertations. The walls of the reading room are decorated with busts of Liebig, Wöhler, and other chemists whose names are well known wherever chemists are to be found; with framed pictures of the Hofmann House in Berlin; and with an enlargement of v. Trautschold's well known sketch of the interior of Liebig's laboratory at Giessen.

True to its purpose, the collection contains two historical features that attract universal attention. On the one side of the reading room, the alchemistic laboratory appeals even to the laity, whereas on the other side a reproduction of Liebig's laboratory at Giessen at once catches the eye of the chemist. The first student's laboratory devoted to science may well appeal to all teachers of science. How striking the contrast in the equipment of the first laboratory and the model laboratories in the other rooms of this exhibit. And yet no laboratory, however, admirably aquipped, will ever occupy such a place in the history of chemistry as this modest room in the "Reitschule" on the Lahn. That the Germans should have run the risk of sending original preparations of Liebig, Wöhler, Mitcherlich, Hofmann and Kekulé shows how much they desired to making a lasting impression on the American mind.

Room IV is devoted to general and inorganic chemistry. Here we find a collection of apparatus for gas analysis that may create envy in the heart of the professor of chemistry of even the most richly endowed American university. German chemists who have visited this country have found fault with the poor equipment of some of our magnificent buildings devoted to chemistry. If this chemical exhibit is to serve as a model it will require much money and some time to perfect our equipments.

Next we have occasion to examine what is called the double laboratory table with its equipment for qualitative and quantitative analysis, both gravimetric and volumetric. A flue is not wanting.

Apparatus for molecular weight determinations according to a a variety of methods, special apparatus of all kinds and an admirable collection of inorganic preparations, both scientific and technical complete the equipment of this laboratory.

Room V serves as a balance room, and

Room VI, another of the smaller rooms is devoted to pyro-chemistry.

Room VII. To what extent physical chemistry has became merely synonymous with electrochemistry is demonstrated in this room. While it is true that thermochemistry and a few other departments of physical chemistry are represented by several cases, the exhibit is, for most part, one of electrochemistry. A well equipped working table for electrochemistry is the most striking feature of the room. Apparatus for quantitative analysis by electrolysis, exhibited by Prof. Classen, fill two cases, and a fine collection of apparatus for the demonstration of lectures on electrochemistry fill three more cases. A collection of preparations, both organic and inorganic, made by electrical methods complete the attractive exhibit of this room.

VIII. Like inorganic chemistry, organic chemistry occupies one of the larger rooms. As one enters the room, a variety of apparatus for elementary analysis attract the eye. The organic laboratory table with a large collection of apparatus illustrating the numerous operations of organic chemistry, occupies a prominent place and arrests the attention of the visitor. Larger apparatus for evaporation and drying, a working table for distillation under diminished pressure, special apparatus for the examination of petroleum and oils, extraction apparatus heated by electricity, apparatus and preparations relating to photochemistry and models, illustrating the stereochemical arrangement of atoms in molecules, according to

Kekulé, Wislicenus, Engler, Bredt and Jacobsen complete the outfit of this laboratory. In addition thousands of organic preparations are exhibited by twelve firms and numerous individuals. Their mere enumeration occupies thirty-five pages of the official guide.

IX. Next to the organic laboratory is that devoted to the chemistry of dyeing. Apparatus, chemicals and samples of dyed materials, arranged in attractive form, illustrate in a striking manner the development which this branch of organic chemistry has undergone since Liebig told the father of a prospective student that he did not train dye masters but that he educated chemists. What a contrast between the rule of thumb methods of Liebig's days and the science of dyeing of to-day.

X. In one of the corridors special apparatus, such as autoclaves, a large vacuum distilling apparatus etc. are exhibited.

XI. The last room is devoted to physiological chemistry and fermentology. Beginning with the antitoxines and modern "synthetics" for medicinal and nutritive purposes; the second case is devoted to the sugars and their derivatives prepared by Fischer, Tollens and others, also to albuminoids and a host of other preparations illustrating animal metabolism; a third case is devoted to gelatin, fats, glycerin, etc.

Apparatus used in the ferment industries and in the manufacture of starch come next. These are followed by an exhibit of the products of these industries, the by-products not to be forgotten. A table for microscopic work, with a complete equipment is an essential adjunct to the chemical part. To illustrate the biochemical methods, models are resorted to for illustration rather than unstable cultures etc. . . .

That a German exhibit in physiological chemistry would be incomplete without devoting a proper amount of space to Buchner's work on the yeast ferment, goes almost without saying. Special apparatus and special processes peculiar to physiological and biochemistry and its industrial applications receive proper attention and are too numerous to be mentioned in detail. True to the general character of the exhibit, this section closes with collections of models for instructional purposes.

Before ending this brief description, attention should be called to the fact that the wall spaces of the several rooms, not hidden by cases etc., are decorated principally with photographs. These not only add to the appearance of the rooms, but they supplement the exhibits of apparatus, preparations, models etc. in the cases. The total effect of each room and of the exhibit as a whole is so striking that it will never be forgotten by those who have had the good fortune to see it and who possess the necessary scientific education to appreciate it.

No greater compliment can possibly be paid the German chemical exhibit than by calling attention to the fact that the French chemical exhibit is in part at least an imitation of the German chemical exhibit at Chicago. The German exhibit at St. Louis, however, is a great step in advance of the German exhibit at Chicago. Indeed it would be difficult to conceive what step might next be taken by way of improvement, unless the Germans were to send their most illustrious representatives to deliver daily lectures and their "Privatdocenten" to instruct individuals in the laboratory. German university extension courses on American soil would certainly attract students from every state of the Union. What a grand idea it would be to attend special lectures on special subjects by such man as Winkler on inorganic chemistry, by Fischer on the sugars, Wallach on the terpenes, Buchner on ferments, Arrhenius and Ostwald on physical chemistry. The instructors of chemistry of this country would flock by the hundreds to attend such lectures supplemented by seminaries. Still greater would be the number of graduate students who would avail themselves of an opportunity to work in specially equipped laboratories under special instructors. All of this now seems like a mere dream, yet who dare deny flatly the possibility of its realization?

American Pharmaceutical Colleges and Schools.

By *Wilbur Scoville.*

No.	Official title of Institution.	Location.	When instituted.	Length of annual session in weeks.	Day or Night Session.
	ALABAMA.				
1.	Alabama Polytechnic Institute	Auburn	1895	39	Day
2.	Medical College of Alabama, Department of Pharmacy. (Dept. of University of Alabama.)	Mobile	1866	28	Day
	CALIFORNIA.				
3.	California College of Pharmacy. (Dept. of University of California)	San Francisco	1872	35	Day
4.	College of Physicians and Surgeons of San Francisco. (Dept. of Pharmacy.)	San Francisco	1898	31	Nt.
	DISTRICT OF COLUMBIA.				
5.	National College of Pharmacy	Washington	1872	26	Nt.
6.	Howard University, Medical Department, Pharmaceutic College	Washington	1868	26	Nt.
	GEORGIA.				
7.	Atlanta College of Pharmacy. (Dept. of Coll. of Physicians and Surg.)	Atlanta	1891	26	Day
8.	Mercer University School of Pharmacy	Macon	1903		
	ILLINOIS.				
9.	Austin College of Pharmacy	Effingham			
10.	Chicago College of Pharmacy. (Dept. of University of Illinois.)	Chicago	1859	31	Day

11.	Illinois Medical College, Department of Pharmacy	Chicago	1901?	26	?
12.	Northwestern University School of Pharmacy	Chicago	1886	Contin.	Day
	INDIANA.				
13.	Northern Indiana School of Pharmacy. (Dept. of Valpariso College?)	Valpariso	1893	50	Day
14.	Notre Dame University, Department of Pharmacy	Notre Dame	1892?	40	Day
15.	Purdue University School of Pharmacy	La Fayette	1884	37	Day
16.	Tristate Normal School, Department of Pharmacy	Angola	1902		
	IOWA.				
17.	Highland Park College of Pharmacy. (Dept. of Highland Park College)	Des Moines	1890	Contin.	Day
18.	Iowa College of Pharmacy. (Dept. Drake Univ.)	Des Moines	1886	26	Day
19.	University of Iowa, Dept. of Pharmacy	Iowa City	1885	38	Day
20.	Keokuk College of Pharmacy. (Dept. of Keokuk Medical College).	Keokuk	1900	31	Day
	KANSAS.				
21.	University of Kansas, School of Pharmacy	Lawrence	1885	39	Day
	KENTUCKY.				
22.	Louiville College of Pharmacy	Louisville	1870	26	Day
	LOUISIANA.				
23.	Medical Dept. of Tulane University, Course in Pharmacy	New Orleans	1838	27	Day
24.	New Orleans College of Pharmacy.	New Orleans	1902		
	MAINE.				
25.	University of Maine College of Pharmacy	Orono	1894	38	Day

MARYLAND.

26.	Maryland College of Pharmacy, Department of the University of Maryland	Baltimore	1841	32	Day

MASSACHUSETTS.

27.	Massachusetts College of Pharmacy	Boston	1823	32	Day

MICHIGAN.

28.	Detroit College of Medicine, Department of Pharmacy	Detroit	1890	31	Eve.
29.	Ferris Institute, Department of Pharmacy	Big Rapids		36	Day
30.	University of Michigan School of Pharmacy	Ann Arbor	1868	39	Day

MINNESOTA.

31.	University of Minnesota College of Pharmacy	Minneapolis	1892	38	Day
32.	Minnesota Institute of Pharmacy	Minneapolis	1886		

MISSOURI.

33.	Kansas City College of Pharmacy and Natural Sciences	Kansas City	1885	28	Eve.
34.	St. Louis College of Pharmacy	St. Louis	1864	29	Eve.

NEBRASKA.

35.	Omaha College of Pharmacy	Omaha	1901?	25	Day

NEW JERSEY.

36.	New Jersey College of Pharmacy	Newark	1892	30	A.&E.

NEW YORK.

37.	Albany College of Pharmacy. (Dept. Union Univ.)	Albany	1881	26	A.&E.
38.	Brooklyn College of Pharmacy	Brooklyn	1891	34	Day
39.	Buffalo College of Pharmacy. (Dept. Univ. Buffallo.)	Buffalo	1886	30	A.&E.
40.	College of Pharmacy of the City of New York, Dept. of Columbia University	New York	1829	29	Day

41.	Board of Pharmacy Institute of City of N. Y.	New York	1901?	Cont.	A.&E.
	NORTH CAROLINA.				
42.	University of North Carolina, Department of Pharmacy	Chapel Hill	1896	34	Day
43.	Leonard Schools of Medicine and Pharmacy. (Dept. of Shaw University.)	Raleigh	1890	28	Day
	NORTH DAKOTA.				
44.	North Dakota Agricultural College, Dept. of Pharmacy	Fargo	1901	36	Day
	OHIO.				
45.	Cincinnati College of Pharmacy	Cincinnati	1850	34	Day
46.	Cleveland School of Pharmacy	Cleveland	1882	31	Day
47.	Ohio Medical University, College of Pharmacy	Columbus	1891	30	Day
48.	Ohio Normal University, Dept. of Pharmacy	Ada	1884	40	Day
49.	University of Ohio, College of Pharmacy	Columbus	1885	39	Day
50.	Scio College. Dept. of Pharmacy	Scio	1888	40	Day
51.	Toledo College of Pharmacy	Toledo	1904		
	OKLAHOMA.				
52.	University of Oklahoma, School of Pharmacy	Norman	1895	41	Day
	OREGON.				
53.	Oregon Agricultural College, Department of Pharmacy	Corvallis	1901?	39	Day
54.	Oregon College of Pharmacy	Portland			
	PENNSYLVANIA.				
55.	Medico Chirurgical College of Philadelphia	Philadelphia	1898	34	A.&E.
56.	Philadelphia College of Pharmacy	Philadelphia	1821	27	Day

57.	Pittsburg College of Pharmacy. (Dept. of Western University of Pennsylvania	Pittsburg	1878	27	Day
58.	Temple College, Dept. of Pharmacy	Philadelphia	1901	35	E.&A.
	RHODE ISLAND.				
59.	Rhode Island College of Pharmacy and Allied Sciences	Providence	1902	34	A.&E.
	SOUTH CAROLINA.				
60.	Medical College of State of South Carolina, Department of Pharmacy	Charleston	1895	26	Day
	SOUTH DAKOTA.				
61.	South Dakota Agricultural College, Department of Pharmacy	Brookings	1888	36	Day
62.	Dakota Normal College, Department of Pharmacy	Sioux Falls			
	TENNESSEE.				
63.	Chatanooga Medical College, Department of Pharmacy	Chatanooga			
64.	Sewanee Medical College, College of Pharmacy	Sewanee	1898?	28	?
65.	Meharry Pharmaceutical College. (Dept. of Walden University.)	Nashville	1888	26	Day
66.	University of Tennessee, School of Pharmacy	Knoxville	1901?	39	Day
67.	Vanderbilt University, Department of Pharmacy	Nashville	1879	39	Day
	TEXAS.				
68.	Bayler University, College of Medicine and Pharmacy	Dallas	1901	26	A.&E.
69.	Dallas Medical College, Department of Pharmacy	Dallas	1900		

70.	University of Texas, School of Pharmacy	Galveston	1893	31	Day
	VIRGINIA.				
71.	Virginia School of Pharmacy of Medical College of Virginia	Richmond	1897	31	Day
72.	University College of Medicine, Department of Pharmacy	Richmond	1893	31	A.&E.
	WASHINGTON.				
73.	Washington Agricultural College, School of Pharmacy	Pullman	1896	36	Day
74.	University of Washington School of Pharmacy	Seattle	1895	38	Day
	WEST VIRGINIA.				
75.	West Virginia University, Department of Pharmacy	Morgantown	1901?	40	Day
	WISCONSIN.				
76.	Wisconsin Medical College, Department of Pharmacy	Milwaukee	1899	31	Day
77.	University of Wisconsin, School of Pharmacy	Madison	1883	36	Day
	CANADA.				
78.	Manitoba College of Pharmacy	Winnipeg	1899	35	?
79.	Montreal College of Pharmacy	Montreal	1867	26	Day
80.	Ontario College of Pharmacy. Dept. of University of Toronto	Toronto	1871	37	Day
	PHILIPPINES.				
81.	Pharmaceutic Faculty University Santo Tomas	Manila	1605	?	?

PUERTO RICO.

School of Pharmacy contemplated.

On "Abietene."

By *W. T. Wenzell.*

In 1871[*] the writer first called attention to the peculiar properties of the hydrocarbon which constituted the bulk of "abietene" obtained from a California conifer. This hydrocarbon differed materially in its properties from those of the pinene, the principal constituent of the more commonly known turpentine oils. Its inertness toward chemical reagents in general and its substitution by chlorine were pointed out.

There properties caused Thorpe[†] to examine its physical properties more carefully and to determine its elementary composition. It was pronounced by him to be identical with normal heptane, a claim that was verified by Schorlemmer and Thorpe[‡] who, in 1883 made a careful chemical examination of the substance in question.

The announcement of the presence of a hydrocarbon of the methane series in a coniferous oil, of which it constituted the bulk, not only created surprise but has been regarded skeptically even in recent years.[§]

In his first communication, the writer stated that the source of abietene was *Pinus sabiniana*, better and more commonly known on the Pacific coast as the Digger pine. Later it was shown that a like product was obtained from *Pinus Jeffreyi*. Thus confusion as to the source of abietene was added to the surprise and skepticism already alluded to.

In order to remove all doubt as to the occurence of normal heptane in the conifers of the pacific coast, the writer desires to present the following historical and other data.

During the Civil War the production of turpentine and resin was practically suspended in the South. As a result the price of these staples rose considerably. In consequence Mr. Burnham, a placer miner near Oroville, Butte Co., conceived the idea to distill turpentine in California. The trees selected for incision appear to have been the Digger pine, groves of which are still to be found near Magalia, formerly known as Dogtown. These trees still show the marks where Burnham had tapped them thirty-six years ago.

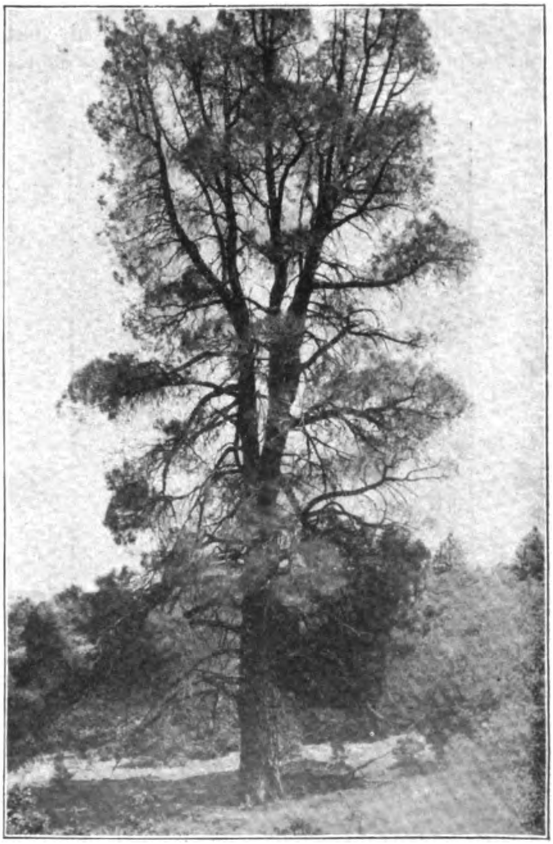
---

[*] Am. Journ. Pharm., 44, p. 97.

[†] Journ. Chem. Soc., 33 I, p. 296.

[‡] Annalen, 217, p. 149.

[§] For a review of the entire subject see this journal, vol. 18, p. 165. Since then (1901) a paper "On heptane from coniferous trees" has been published by W. C. Blasdale in the Journ. Am. Chem. Soc., 28, p. 162.—*Ed.*

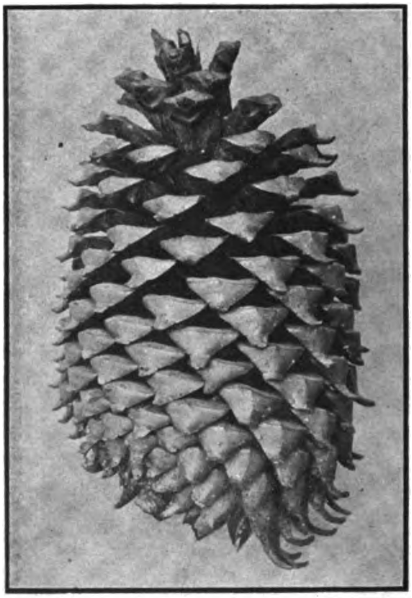


Pinus sabiniana.

The semiliquid resinous exudation thus obtained was distilled. The oily distillate he disposed of to the wholesale drug houses of San Francisco, and the resinous residue to Hucks and Lambert. By destructive distillation the latter obtained from the resin an oil which entered into the composition of an axlegrease manufactured by them.

Thus it came about that in 1868 abietene appeared in the San Francisco market as a substitute for turpentine and that the writer's attention was drawn to it with the result alluded to in the introductory sentence.

In order to satisfy himself as to the botanical source of abietene, the writer made a trip to Oroville during the spring of 1869. Here he found Mr. Burnham who made no secret of his enterprise. He stated that his still was located near Dogtown, in a grove of Digger pines, about thirty miles north of Oroville. He gave the writer a cone from the tree from which he collected the turpentine. Furthermore, he informed the writer, that he incised the trees and collected the turpentine during the hot summer months when the exudation flowed freely but that the distillation was conducted as soon as cold weather set in.



Cone of *Pinus sabiniana*.
Photograph of the cone obtained from Mr. Burnham in 1869.

On his return to San Francisco, the writer called on Professor H. V. Bolander, State Botanist, who was at that time considered the highest authority on conifers on the Pacific slope. He pronounced the cone as belonging to *Pinus sabiniana* Dougl. It was for these reasons that the writer felt justified in assuming that abietene was derived from the Digger pine.

Pinus Jeffreyi.

In as much, however, as doubt existed in the minds of some* as to the occurence of heptane in *Pinus sabiniana*, the writer later enlisted the cooperation of Professor J. G. Lemmon of Oakland, Cal. In the summer of 1900, a joint visit was made to Mount Diablo, thirty miles distant from San Francisco.

---

* See Sadtler: Am. Journ. Pharm, 71, p. 176; also Trimble: Garden and Forest, 10, p. 202.

It may be of interest to call attention to the fact that this celebrated mountain, which, according to the U. S. Geodetic Coast Survey, has an altitude of 3850 ft., is largely covered by two cone-bearing trees, the *Pinus Coulteri* and the *P. sabiniana.* The former commonly known as the "big cone pine," is distinguished by the heaviest cones which often weigh from five to eight pounds, are from twelve to fifteen inches long and are armed with large spines. Its habitat is Mitchell's Cañon, situated on the northern slope of the mountain.

The *Pinus sabiniana* grows on the western slope in Pine Cañon. It bears cones darker in color, from seven to nine inches in length, weighing from two to five pounds. The leaves like those of *P. Coulteri*, are in threes, but the foliage is more scant and of a striking grayish color, by which a grove of these trees may be recognized at a distance of many miles.

Samples of the turpentine from both species were collected and before leaving arrangements were made with Mr. J. S. Taylor, editor of the Weekly Transcript of Concord — at the foot of Mount Diablo — for an additional supply of material.

Having returned to San Francisco, the samples were subjected to steam distillation. The distillate from the Digger pine possessed the physical properties of abietene in every particular, whereas that from the big-cone pine showed those of a terpene.

For further proof of the existence of abietene in *P. sabiniana*, the reader is referred to a paper by W. C. Blasdale, Instructor in the Chemical Laboratory of the University of California, which was published in 1901 in the Journal of the American Chemical Society.* The presence of normal heptane in this pine may, therefore, be regarded as established beyond doubt.

Now, as to the presence of abietene in *Pinus Jeffreyi.* At the request of Mr. Green, of Oroville, Professor J. G. Lemmon, Botanist for the California Board of Forestry, in December 1890 visited the grove of trees where abietene was then distilled.† He ascertained that the tree from which Mr. Green obtained his abietene was *Pinus Jeffreyi* Murray and found the distillate to possess the odor and common properties of abietene. The young branches, when broken, also exhaled the pleasant orange-like odor peculiar to abietene.

---

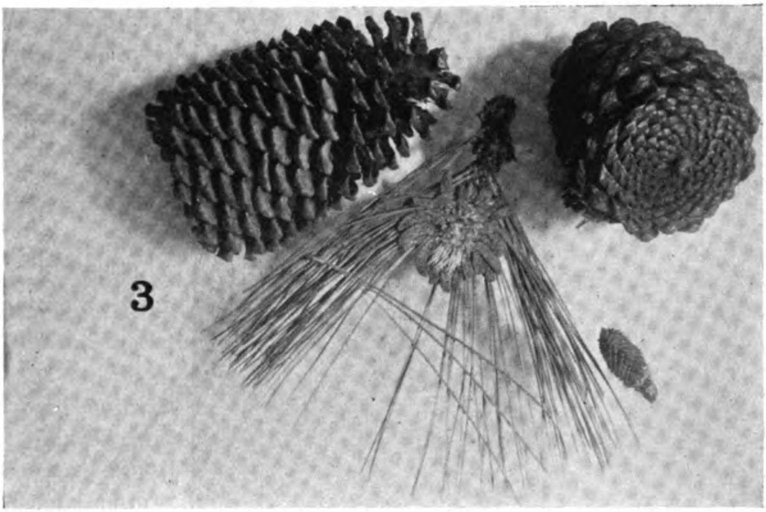
* Vol. 23, p. 162.

† Comp. San Francisco and Pacific Druggist, Mch. 1896.

The abietene used by Venable and Grisson,* having been distilled by Green in Oroville was, therefore, from *Pinus Jeffreyi.*

This pine is often mistaken for *P. ponderosa.* Both species occur at similar altitudes on the slopes of the Sierras. The person who sent a specimen of oil to Professor Sadtler* was evidently mistaken as to its source. That *P. ponderosa* does not yield abietene but a terpene was shown by Miss Goodspead.†

Pinus Jeffreyi is found in the more elevated regions and, according to Professor Lemmon, extends over a large area, from western Montana, through Idaho, Oregon and California to the peninsula of Lower California. It is particularly abundant in the southern Sierras and the San Bernardino Mountains.



Cones and leaves of *Pinus Jeffreyi.* Photographed by Prof. Lemmon.

Pinus sabiniana, on the other hand, does not generally grow at a very high altitude, being confined principally to the foothills of the Coast Range of California and to those of the Sierras extending from San Bernardino into Oregon. Its cones are larger.

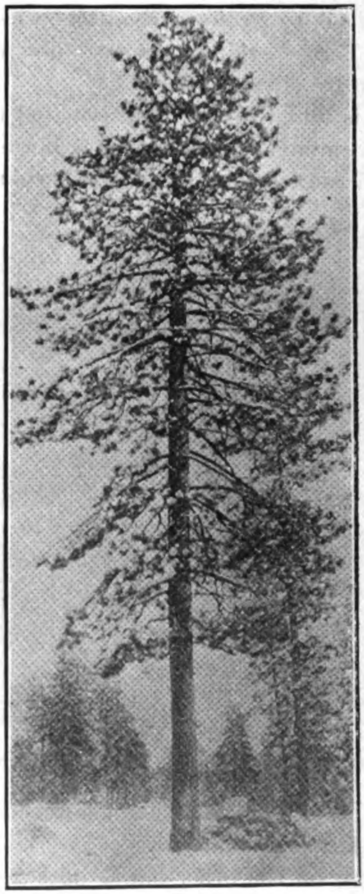
In different localities several varieties of *P. Jeffreyi* are distinguished: var. *penninsulares* (Lemmon) in the San Rafael Mountains of Lower California, with abundant cones six to eight inches long;

---

* Am. Chem. Journ., 10, p. 225.

† Thesis, California College of Pharmacy-

var. *montana* (Lemmon), a tree of the lake region of western Montana, with purple cones and long glaucous foliage. These varieties probably also yield abietene.



In conclusion, the writer may state there are now two indigenous conifers on this coast that are known to yield abietene; that the production of abietene is no longer conducted on a large scale as at the time when it was supplied to the trade in five gallon tin cans; and that the only way at present to obtain abietene is through Mr. R. M. Green, a druggist of Oroville, who is now the only distiller of abietene in California.

The Oxymethylanthraquinone Drugs and their Assay.

By *A. Tschirch.*[*]

In a paper "Versuch einer Theorie der organischen Abführmittel, welche Oxymethylanthraquinone enthalten."[†] I proved that the cathartic action of the group of cathartics which includes senna, frangula, rhubarb and aloes as well as pure oxymethylanthraquinone depends upon glucosides, which I now designate as anthraglucosides. I unite herewith the observations of two of my students, namely Aweng upon rhubarb and frangula, and Pedersen upon aloes. Later I have still further studied this group of cathartics: with Hiepe, *Folia Sennæ;* with Polacco, *Fruct. Rhamni cathartici;* with Heuberger, Christofoletti and Eijken, Rhubarb; with Klaveness, Aschan, Hoffbauer and Kühlenstjerna, Aloes.

The question is now so far cleared up that the above mentioned proposition can be considered as sufficiently established. In fact it has been accepted by clinicians, for instance Ebstein and Ewald; Pharmacologists: Magnus, Brissemoret, Gottlieb and Husemann; Chemical Physiologist: Fränkel; the chemical industries also have turned towards oxymethylanthraquinone and related substances.

Within a year there appeared upon the market from the laboratory of Knoll & Co., Ludwigshafen, Purgatin or Purgatol (under German patent No. 117,730) which is the diacetate of anthrapurpurin or trioxyanthaquinone 1. 2. 7. which according to Vieth and Ewald is cathartic in doses of 0.5—1.0 Gm. In addition, my students and I have already determined the cathartic action of emodin, rhein, alochrysin and chryophanic acid (better designated as chrysophanol), also many others have tested the anthraquinone derivatives.

According to Vieth they are active in the following doses:

Purpuroxanthin = 1.3 dioxyanthraquinone 0.6 Gm.
Anthragallol = 1. 2. 3. trioxyanthraquinone 0.3 Gm.
Purpurin = 1. 2. 4. trioxyanthraquinone 2.0 Gm.
Flavopurpurin = 1. 2. 6. trioxyanthraquinone 0.2 Gm.

---

[*] Translated from the Pharm. Post, 1904, Nos. 17—19, by A. B. Stevens.
[†] Schweiz. Wochenschr. für Chem. and Pharm. 1898, Nr. 23.

Anthrapurpurin = 1. 2. 7. trioxyanthraquinone 0.1 Gm.
Alizarinbordeaux = 1. 2. 3. 4. tetraoxyanthraquinone 1.0 Gm.

The diacetyl combination of anthrapururin is better than anthrapurpurin to prove the evident splitting up in the bowels of substances like the anthraglucosides, for the long continued action of the oxymethylanthraquinone drugs depends directly upon the slow splitting up of the glucoside in the bowels. Purgatin would be designated by Ewald as a mild cathartic, like rhubarb.

Recently there has appeared upon the market Exodin, the diacetylrufigallic acid tetramethylether from the laboratory of E. Schering. According to the experiments of Eberstein it always acts promptly, efficiently and without pain in doses of 1 Gm.

The rufigallic acid (trioxyanthragallol, hexaoxyanthraquinone), the acetylrufigallic acid, and rufigallic acid tetramethylether, according to Ebstein, have proved inactive, and according to Vieth, also alizarin, alizerin blue, chinizarin and methylchinizarin, nitropurpurin and cyanin.

Also, recently the derivatives of aloes are receiving some attention. The methylderivative of aloes obtained by the condensation of aloin with formaldehyde acts as well as aloin and is tasteless. By the acetylixation of aloin, tasteless triacetylaloin is obtained which Hans Meyer found to be as active as aloin. On the other hand tribromaloin is less active.

In my first paper (1898) I have already pointed out that now, since we posess a better knowledge of the constitution of cathartics, it will perhaps be possible to acertain which atomic linking to the nucleus must be effected in order, to make a substance "eccoproticogen" (produce cathartic action). Emodin is the most active then follows alochrysin, and chrysophanic acid (chrysophanol) which is the least active, so I believe that besides the methylanthraquinone nucleus, that the number and the position of the hydroxyls in the nucleus must have a decided influence on the cathartic action. A review the above cathartic substances shows that the methyl group is unimportant, for the methylanthraquinone derivatives are inactive while the anthraquinone derivatives are active.

Brissemoret grasped my ideas and further pursued the investigation of a large number of ketones, especially quinones and found that many were cathartic, as for example resorufin, indophenol, aurin, oxydiphenoxazone, rosolic acid etc. That embelic acid and pereson are cathartics is also known.

He concludes as follows:

"However it seems not indispensable, in order that the enerment of the bowels may be stimulated by a substance with the character of a ketone-quinone because the function is diketonic, a simple grouping of ketone-quinone can suffice for that purpose. I draw this conclusion from experimental results obtained with oxime-quinone, resorufin."

"It proves that the group ketone-quinone may be attached to the nucleus of benzene, of naphtaline, or anthracene, in other words, that benzoquenone, naphthoquinone and anthraquinone are eccoproticophores, and that many of their derivatives are purgatives."

As the matter now stands, one can say that the quinone nucleus is necessary to produce an increased stimulation of the peristalsis of the intestines. There are many substances that have this nucleus but posess no cathartic action, so we must add still another group to the eccoproticophor nucleus to make the substance eccoptoprotigen. I have already, in 1898, called attention to the fact that the quinone group by an equal assignment of hydroxyl and fatty side chain, in addition to the position of the hydroxyl in the nucleus, will come into consideration. More than this we cannot at present say. Many more substances with ketone or quinone nuclei must be examined before a law can be deduced.

As soon as enough material can be obtained we will make comparative investigations with both emodines. Because as Oesterle has shown, there exist in drugs two different emodines which probably differ only in regard to the position of the hydroxyl. The emodin from aloes has a melting point of 224°, that from frangula 250°. Of all tried drugs emodin is by far the best. Ebstein to whom we owe, as is well known, the standard work upon cathartic remedies, designates it as a "very valuable cathartic." Unfortunately there are many apparent difficulties in the way of the separation of emodin from drugs. Senna falls out of consideration from the start on account of the small amount of emodin which it contains, and also rhubarb which produces only a small quantity of pure substance. I obtained the most from frangula and cascara sagrada. Their superior action, especially of the fluid extract is ascribed to emodin and its anthraglucoside. We posess in frangula a cathartac which, in fact, approaches the ideal, and is only a little behind emodin. There are at present upon the market numberless secret remedies and specialties prepared from these drugs which appear under different names, as, cascarin, sagradin, sagradol etc. They are all indebted to emodin and its anthraglucoside for their action, indeed some are nothing else but impure emodin.

As there are difficulties in the way of the production of pure oxymethylanthraquinone from drugs, I have already proposed to the profession, a mixture which contains nearly all of the oxymethylanthraquinone which the drug contains. I was guided by the observations, that the free oxymethylanthraquinone as well as the anthroglucoside is dissolved by dilute alkalies and separated from this solution by acids. I therefore proposed to exhaust the drug with dilute potassium or amonium hydroxide, to precipitate with hydrochloric or acetic acid, to wash the precipitate and dissolve in alcohol, and to evaporate the solution. The substance thus obtained to be named according to the source; anthraglucorhamnin, anthracglucorein, anthraglucosagradin etc. Those names which figure in Merck's Catalogue are only makeshifts, and their relative doses are yet uncertain. The limit of cheap emodin manufactured direct from the drug is not yet reached, but it will be obtained in an indirect way. I have already in my first paper* stated that Pedersen and I were successful in producing emodin from aloin. Prof. Oesterle has, during continued experiments in my Institute, produced about 500 grammes of this expensive substance from aloin. Unfortunately this was all consumed in the numerous experiments which were undertaken to clear up the constitution of these bodies. Prof. Oesterle obtained emodin by the continued boiling of aloin with hydrochloric acid, and also by the same method as Pedersen, but the yield is not good. Many by products are formed and the reaction requires a long time. Perhaps by the use of potassium persulphate or Caro's acid, and by varying the conditions, better results may be obtained as suggested by Seel. Previously Seel obtained by the reaction only trioxymethylanthraquinone, but, as Oesterle has shown, we obtain by the oxidation of barbaloin with chromic acid mixture, alochrysin, a substance closely related to emodin, which however still posesses cathartic properties. Evidently the oxidizing agents previously employed were to strong. From the studies of Messrs. Achen, Klaveness and Hoffbauer, I have made numerous observations during the last year that taught me that aloin is spontaneously converted into emodin and crystallizes when solutions are allowed to stand for a long time.

---

* **Ber. d. Pharm. Ges., 1898.**

There is no doubt that in time we shall be able to succeed in obtaining a good yield of emodin from aloin, from cheap easily obtained material. That will be a great gain. because all agree that none of the previously artificially produced cathartics have attained the definite action of emodin, in dose of 0.2 grammes, without any unpleasant effects.

Besides there appears before me a still higher goal which is also attainable, namely, the artificial production of emodinglucosides. Since through Emil Fischer we have learned the method of manufacture of sugarethers and sugaresters, there are scarcely any difficulties in the way of the production of emodinsugarethers. Then I must once more emphasize, that I think the glucosideethers of oxymethylanthraquinone will have even more of a future than the oxmethylanthraquinones themselves.

I have already, in 1898, proven by an unquestionable investigation, that, besides free oxymethylanthraquinone, anthaglucoside also exists in senna, rhubarb, frangula and sagrada. By exhausting the extract from these drugs with ether and thus freeing it completely from free oxymethylanthraquinone, then boiling the extract, after extraction with ether, with dilute sulphuric acid, it once more yields a small amount of oxymethylanthraquinone. The presence of glucoside may be proved in the extract. Moreover it has been continually emphasized, especially by Aweng, that in the drugs named the cathartic glucoside was not only present, but even played the important part.

At the present time emodin glucoside, in more or less pure form has been isolated as follows: frangulin from frangula bark by Casselmann, Faust, Schwabe and Aweng; purshianin from cascara sagrada by Dohme and Engelhard;* cuspidatin from *Polygonum cuspidatum*, and glucosennin from senna by Hiepe and myself; glucocathartin from the fruit of *Rhamnus catharticus* by Polacco and myself; and rheumemodinglucoside from rhubarb by Aweng, Heuberger and myself. Further Gilson isolated chrysophanol glucoside from Rhubarb. The cathartic acid of Dragendorff, Kubly,

---

* Comp. the recent papers on this subject presented by Dohme and by Jowitt to the Am. Pharm. Assn. at its last meeting in Kansas City. — *Ed.*

Greenish, Elbern, Stockmann and Genszist is nothing else but a mixture of impure anthraglucoside, as shown by Heuberger, Hiepe and myself.

Probably, as Brissemoret suggests, anthroglucoside will be found also in *Albizzia saponaria*, *Viviana esculenta*, *Rhamnus japonica*, *Tecoma ochracea*, *Marinda citrifolia*, *Rhumex acutus*, *R. obtusifolius*, *R. hymenosepalus*, and perhaps also in the varieties of *Sanadera* and *Quassia*.

After all it must appear highly probable that aloin is an anthraglucoside, — in fact Léger has presented the hypotheses that barbaloin is an aldopentose — methylisooxychrisasinether with the formula $C_{21}H_{20}O_9$. So much may be said for this hypotheses. I hold that it is not yet sufficiently supported. My investigations caried me always back to the old formula $C_{16}H_{18}O_7$, but it is certain that aloin in the bowels as well as in the laboratory forms emodin, and yet I do not want to assert that its cathartic action rests only upon this emodin forming.

The experiments with the drugs by Buchein, Nasse, Tappeiner and Brandl, and with oxymethylanthraquinone by Asher, Esslemont and others, and also the experiments of Ebstein with the new synthetic cathartics, are of equal value as proof that all the drugs of the groups named and their isolated substances, act upon the peristalsis of the bowels. Ebstein designates them emphatically as peristaltic remedies. I believe to be able to draw the conclusion that these substances in question depend upon peristaltic action.

It is further proven that these substances in their action are independent of the presence of bile in the intestines (Stadelmann) and that they are without influence upon the bowel secretion, (Thiry, Brieger and Flemming).

The oxymethylanthraquinones, especially emodin, very nearly approaches the ideal cathartic. Consequently the previous question has been solved; i. e. which of the active substances are to furnish the basis for assay. One must start from two different view points, and divide the drugs into two groups, one to contain rhubarb. Senna and frangula and the other aloes. Those of the first group contain oxymethylanthraquininone, free, and as glucoside; the second furnishes under certain conditions emodin, but in no case is the change quantitative. Hence this recommends itself in another way.

While we now clearly understand the tests for the presence of aloes and the oxymethylantraquinone drugs in mixtures, the quantitative determination of their value is more difficult. With my modified form of Borntrăger's reaction we can easily recognize rhubarb, senna and frangula. Histed's reaction gives us a good test for distinguishing Nalaloes from all others, and inversely, Schouteten's reaction the other varieties from Nalaloes. (Heuberger, Aschen and Tschirch). On the other hand we may easily distinguish varieties of aloes which contain isobarbaloin (Leger); (Barbadoes aloes and Curacao aloes) from those which contain isobarbaloin free (Cape and Uganda) by Klunge's halogen or cyanide reaction, (Leger, Tschirch and Aschen). Nothing is easier nor can be determined with a more simple reaction than to prove the presence of Cape aloes is a mixture.

As has been stated the conditions are more difficult when we undertake a quantitative estimation. Here however investigations have not been wanting. Konbracki estimated aloes in the following manner: First weigh that part insoluble in very dilute sulphuric acid and alcohol, then the part soluble in 50% alcohol, then the resin and finally the water extract. With frangula and rhubarb, Aweng proposed to weigh on the one hand the acetone soluble part, (secondary glucoside), and on the other hand, that part soluble in 60% alcohol (primary glucoside). This method is frequently used in practice, for instance, by Dieterich on frangula, by Jakabhaxy on rhubarb. It produces however a mixture of anthraglucoside and tannoglucoside.

I have worked out another method for both groups of drugs, but I will not deny certain merits in the methods of Kondracki and Aweng.

Rhubarb.

Ether will completely remove oxymethylanthraquinone, when free, from watery solutions of rhubarb, and also from senna and frangula; then the oxymethylanthraquinone may be completely removed from the ethersolution by shaking out with an alkaline hydrate solution. This alkaline solution gives a very characteristic absorption band. Upon this property I based a method of determination, in 1900. I began with a standard emodin, 1:50,000, and with the aid of my apparatus (Illustrated in Arch. d. Pharm. 1884, p. 129) determined the depth of a layer of the solution required to produce clearly the absoption band between λ—0.490μ and λ—0.570μ about as represented in Table II, Fig. 5, second section, Ber. d. Pharm. Ges. 1898. The absorption band appears clearly with a layer of solution 32 mm. deep. The alkaline solution of the drug was compared with this standard emodin solution. The solution from the drug was prepared as follows:

Half a gramme of the finely powdered drug was boiled for five minutes with 50 cc. of alcoholic solution of potassium hydroxide, filtered, and again boiled for five minutes with 50 cc. more of the alcoholic solution. The second time the color of the solution was very weak and the drug was practically exhausted. The united filtrates were acidulated with 20 cc. of dilute hydrochloric acid, and shaken out twice with 100 cc. of ether each. The second time the ether gave only a weak oxymethylanthraquinone reaction. The oxymethylanthraquinone was removed from the ether by shaking out twice with 100 cc. of ammonia water. The amoniacal solution was put into a 500 cc. flask and filled with water. Tests were then made to determine how deep a layer of this solution must be taken to obtain the same spectrum that was produced by 32 mm. of the standard emodin solution.

The experiments which Mr. Hiepe carried out gave the following results:

	Oxymethylanthraqinone.
Cort. Frangulæ	2.6%
Rhiz. Rei	1.5%
Folliculi Sennæ	1.15%
Fol. Sennæ Alex	1.0%
" " Mecka,	0.97%
" " Tripolitan	0.86%
" " Tinnevelly	0.80%
" " *obovat*	0.70%
" " *resina liberat*	0.64%

At the time I added these words: "These determinations are of a preliminary character only. The results are less indicative of the absolute content than of relative quantities. They afford an opportunity of judging one drug with reference to others, especially with regard to their oxymethylanthraquinone content."

The method is not practical as it requires a spectrum apparatus of special construction, and spectrum analysis requires the observations of a practiced eye. It contains yet another defect. We now know that anthraglucosides and their derivatives are very sensitive to alkalies, and also that ammonia is a poor aid in shaking out solutions. I have therefore varied the method, i. e. changed it to a new colorimetric method that may now be used in practice. It was first tested upon rhubarb. The experiments were conducted by Mr. Cristofoletti. The method is as follows:

Half a gramme of rhubarb in fine powder was boiled for 15 minutes with 50 cc. of 5% sulphuric acid, using a reflux condenser. When cold the mixture, without filtering, was placed in a separator and shaken out with ether, using 50 cc. each time until the ether ceased to give a red color when shaken with dilute potassium hydroxide, this usually required from 4 to 5 portions. The watery solution was heated on a water bath until free from ether, and again boiled for 15 minutes as before, and when cold, shaken out with ether using 50 cc. each time. Three portions are usually required. The united ether extracts were placed in a separator and shaken out with 250 cc. of 5% potassium hydroxide solution, and repeated with 50—100 cc. more of the solution until both solutions were colorless. The united alkaline solutions were diluted to 500 cc. One hundred cc. of this solution were diluted to one liter, which gave a solution representing one gramme of rhubarb in 10,000 cc. A portion of this solution was then diluted until its color was the same as a standard emodin solution, which was prepared by dissolving 0.001 gramme of emodin in one liter of distilled water with some potassium hydroxide solution. The emodin used was pure, dried, aloes emodin of constant melting point. The solution is 1—1.000.000. In a thick layer, for example in a liter flask, the color is very weak, cherry red. A 10 mm. layer is colorless. The absorption band is visible in a layer 300 mm. thick, but not clear. The comparison is made ,by placing the liter flask of standard emodin solution on white paper, and by the side of it a like flask of the solution to be tested, and the latter diluted until the depth of color is the same as that of the standard solution.

In all investigations distilled water must be used, as the lime in hydrant water forms a combination with oxymethylanthraquinone and produces a precipitate.

While the concentrated emodin solution is less permanent, the dilute solution will keep for a week without decomposition.

The method depends upon th consideration that the drugs contain in addition to free oxymethylanthraquinone, anthraglucoside which is very easily hydrolized by sulphuric acid and the free oxymethylanthraquinone completely removed by ether, and from the ether, completely removed by an alkaline solution, producing a cherry red color. To be sure, the color varies a little. With some varieties of rhubarb the color shows some yellow but the red always prevails, so that a comparison is possible. With all good varieties of rhubarb the color remains red and is a very good means of distinction.

Varieties of Rhubarb	Color of Powder	Color of Sol. when compard with Standard.	Cc. of Solution used 1—10,000.	Oxymethyl-anthraquinone in relation to Emodis
Rh. Shensi flat	reddish-yellow	red	300 Cc.	3.3%
Rh. Shensi	light reddish-yellow	red	350 Cc.	2.8%
Rh. Shanghai flat	gray reddish-yellow	red	300 Cc.	3.3%
Rh. Shanghai	light yellow	red with a little yellow	300 Cc.	3.3%
Rheum palmatum β-tanguticum cultivated in Bern	light brownish-yellow	reddish-yellow	350 Cc.	2.8%
Rh. Canton flat	reddish-yellow	red	250 Cc.	4.0%
Rh. Canton Ia	light yellow	reddish-yellow	400 Cc.	2.5%
Rh. Canton IIa	light brownish-yellow	reddish-yellow	350 Cc.	2.8%
Rh. angelicum	gray reddish-yellow	yellowish-red	400 Cc.	2.5%
Rh. angelicum round	gray brownish-yellow	yellow with a little red	550 Cc.	1.8%
Rheum officinale Baillon cultivated in Bern	light brownish-yellow	reddish-yellow	500 Cc.	2.0%
Rh. gallicum	red brownish-yellow	red with a little yellow	350 Cc.	2.8%
Rheum Collinianum cultivated in Bern	grayish-yellow	grayish-red	550 Cc.	1.8%
Rh. austriacum (Gehe)	grayish-brown	yellow with a little red	600 Cc.	1.6%
Rh. ausriacum (Caesar & Loretz)	brownish-gray	yellow with a little red	600 Cc.	1.6%
Rh. raponthic	light grayish-yellow	orange	800 Cc.	1.2%

The preceeding table gives a view of results. I am indebted to Messrs. Worlée and Blembel, Hamburg, for the samples of Chinese rhubarb, and to Caesar & Loretz, and Gehe & Co. for European samples. For comparison, three samples were cultivated for me in the Botanical Gardens in Bern; *Rheum palmatum, β-tanguticum, R. officinale* Baillon, and *R. Collinianum.* The species were determined by comparison with authentic specimens. The Bern samples were simply dried in the air without previous treatment. The table shows that the numbers according to my potassium method were too low. Chinese rhubarb contains as high as 4% of oxymethylanthraquinone, combined and free, calculated from emodin. It further shows that the better varieties of true Shensi rhubarb of the variey Canton flat, surpasses the Shanghai variety. It also shows from the varieties cultivated in Bern, that *Rheum palmatum* is by far the best. It surpasses *R. officinale* as well as *R. Collinianum.* I have already, in the Anatomical Atlas which Prof. Oesterle and I have publised, emphasized the fact that of all the varieties of rhubarb, from all sources, *Rheum palmatum* stands first. The European falls below the Chinese with the exception of the variety, *callicum.*

Since the article appeared in the Pharm. Post the method has been satisfactorily tested upon the other drugs of the group with the following results:

	Free and combined oxymethylanthraquonine.
Cort. rhamni frangulae (3 samples)	4.5—5.0%
" " " Powdered	5.0%
Cort. rhamni purshianae (3 samples)	1.4—2.0%
" " " Powdered	1.6%
Fol. sennae alexandrinae	1.0%
" " Tinnevelly	1.2%
Folliculi sennae	1.33%
Fruct. rhamni cathartici	0.76%

(*To be continued.*)

The Cultivation of the Opium Poppy *Papaver Somniferum*, L., and the Production of Opium in the United States.*

By *W. O. Richtmann.*

The production of opium in the United States was recommended as early as 1764, and accomplished in 1788. The production of opium in this country has been looked upon with general favor by the agricultural, medical and pharmaceutical press. In a few instances only are objections urged to the development of the above industry. Those who have studied the conditions necessary for the production of opium as a rule, relieve that it cannot be done profitably.

The experiment has been tried in practically all of the states east of the Mississippi River. Maine and Indiana are the only exceptions. In Minnesota, Texas, California and Washington, west of the river trials have also been made. These experiments have been conducted on small and large scales. In some instances only a few plants were grown in a flower garden, while in others several acres of the plant were cultivated. In the latter case, instances are recorded where the opium produced has been sold with and without profit.

No data are available as to the quantity of opium that has been produced in this country. The qality is recorded in statements of the physiological action of the opium, and in the later experiments, by assays of the morphine content. These assays report that the morphine content ranges between 6 and 15%.

These experiments have been conducted with more or lees regularity year by year for more than a century.

The periods of greatest activity are found when the country was engaged in its several wars, with the exception of the Mexican and Spanish-American Wars, when conditions were such as to cause no interference with the importation of the imported product.

The opium poppy has also been cultivated for its seed, and the oil of the seed.

In many of the above experiments various suggestions have been tried to facilitate the collection, improve the quality or increase the quantity of opium produced. All have resulted with very indifferent success.

---

* Abstract of a paper read before the Scientific Section of the A. Ph. A. at the Kansas City meeting.

Historical Fragments.

By *Edward Kremers.*

The importance of studying a science from an historic point of view should not require emphasis in an age in which the concept of evolution is a prime factor in human development. If we possess positive knowledge of any kind, none is more certain than that our present acquisitions are based on the past and that we are not much nearer absolute truth than most of those who have preceeded us. In the sciences it is, therefore, of special import that we should recon with the past as well as with the future in order to fully appreciate the present. The mind that will grasp the present state of knowledge as a mere incident in the process of evolution is much less apt to be dogmatic, and therefore more scientific than the person whose mental attitude causes him to be satisfied with the present status of knowledge and its possible applications, however valuable these may be.

It follows, therefore, that it is important to cultivate the historic spirit. While history has been possessed by the scientific spirit for fully a century, it cannot be said of the sciences that they have been equally influenced by the historic spirit. It is true that a few scientists have always recognized the importance of the study of the history of science, but the large mass of scientific investigators and teachers have not been imbued with this spirit, nor were they influenced materially by it. Fortunately for science, as a factor in the history of civilization, a change is taking place. Not only is the interest in the history of science and the sciences greater than ever, but a veritable renaissence is being experienced in the study of the history of the professions based on the natural sciences.

Chairs for the history of medicine have been established in this country as well as in Europe; a literature is rapidly developing to such an extent that within the past decade several new journals have been devoted entirely or in large part to the history of medicine; museums for the safe keeping and exhibition of objects historic interest have been founded in several countries.

Pharmacy, though it has but few workers, has not been slow to partake of this historic spirit. The "Historische Apotheke" in the Germanic Museum at Nürnberg and Peters' two volumes of essays need not fear comparison. They have stimulated not only the pharmaceutical profession, but the medical profession as well to greater activities.

Germanic Museum at Nürnberg.

Having pointed out the trend of the times, the writer need not apologize for having dabbled in the history of his chosen profession. In as much as there are no professional historians in pharmacy, at least not in this country, one may well take up historical studies in pharmacy as a pass time and recreation without fearing the criticism of dilletantism.

The object of the following bibliography is not to make an array of historical notes and essays published from time to time by the writer, but to point out to others how some of their leisure hours can be turned to advantage along this line. The writer has had occasion more than once to see how interested pharmacists have become in historical aspects of their calling that he feels confident that the number of workers can be increased materially if dormant energies be but awakened and influenced to move in the right direction.

Preparation of Theriac.

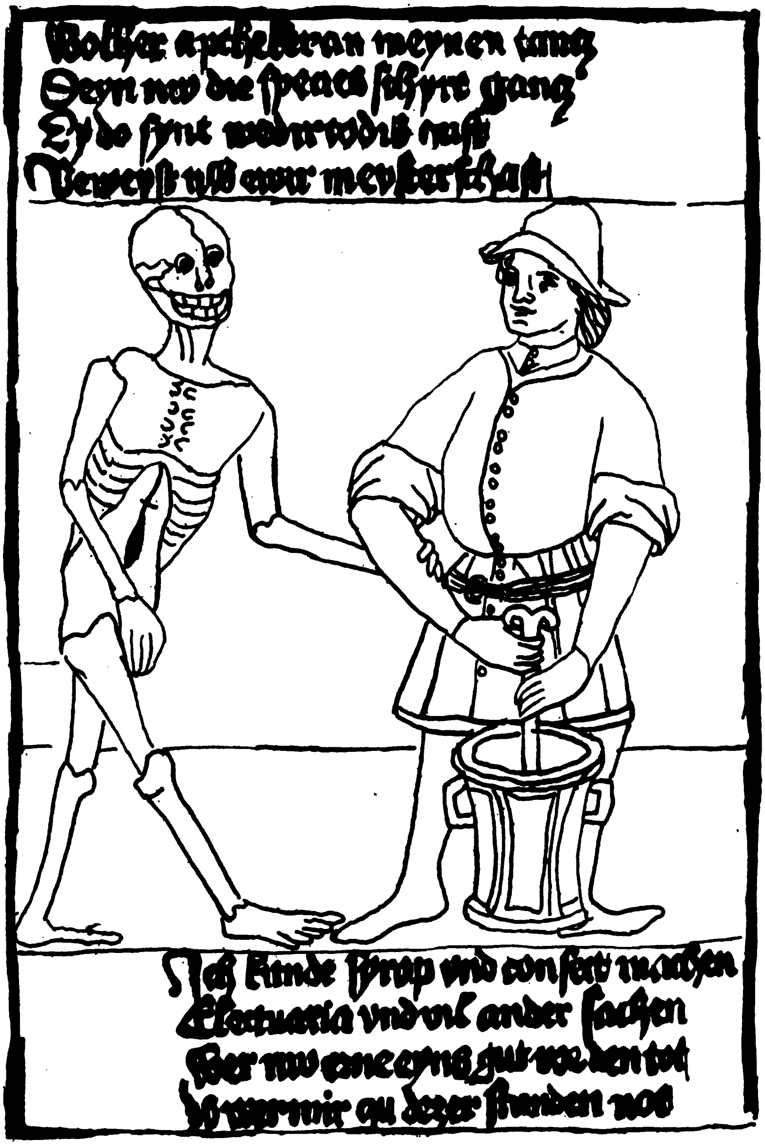
In the course of his "Wanderjahre," the writer had the good fortune to visit the Germanic Museum at Nürnberg. Among the exhibits which be enjoyed most, the historical drug store ever after haunted him. While it, no doubt, seemed ridiculous to some at first, the writer conceived the idea of collecting material for an historical drug store in Wisconsin, such a drug store to represent the development of pharmacy in the Badger state during its first fifty years of statehood. In 1897 the work of collecting had progressed to such an extent that the Wisconsin Pharmaceutical Association was willing to take charge of the work. Since then the progress made has been such that in July 1905, when the W. P. A. meets at Madison to celebrate its twenty-fifth anniversary, such an historical drug store will be one of the features of the meeting.

Among the objects saved from destruction are two packages of "Common salt mixture," such as had been used for desinfecting purposes at Camp Randal during the revolutionary war As far as known, these are the only packages of their kind in Wisconsin. Should similar packages exist elsewhere, the writer should be pleased, to learn of them. The National Pharmaceutical Museum to be established by the American Pharmaceutical Association should not be without them.

In order to call attention to these interesting war relics, the writer described them and had them reproduced photographically. (No. 1.) It does not require any historical training to do work of this kind. Every one who takes any interest at all in the development of his calling can thus bring to the attention of others his historical treasures. It is true we may not find fine porcelain containers several hundred years old or alembics used by pharmaceutical alchemists of past centuries, but the more modest relics of our own brief past are none the less interesting to us. Each state ought to collect such relics and in the course of time develop local pharmaeeutical museums. No influence will be found more potent in counteracting the spirit of commercialism of which we at present hear so much.

For several years previous to 1897, the writer spent a few weeks of his summer vacations in Milwaukee. A part of this time was devoted to the collection of historical data pertaining to pharmacy in Wisconsin. (No. 2.) Many a visit was had particularly with the older pharmacists. While these visits were very pleasant and resulted in the collection of valuable information, the writer was greatly impressed with the inaccuracies and contradictions of traditions. Nothing is more dangerous at times than to rely on oral statements made from memory.

Though, as a rule, we entertain no high regard for newspapers, yet these daily sheets, yellow though they often be, are recorders of


Wol her apotheker an meynen tantz
Seyn nu die ſpecien ſchyre gantz
Und do ſynt wedir todis craft
Bewyſt nu euwir meyſterſchaft
Ich kunde ſyrup und confect machen
Electuaria und vil ander ſachen
Wer nu eyne ertzney gut wedir den tot
So were mir zu dezer ſtunden not

Death and the Apothecary.

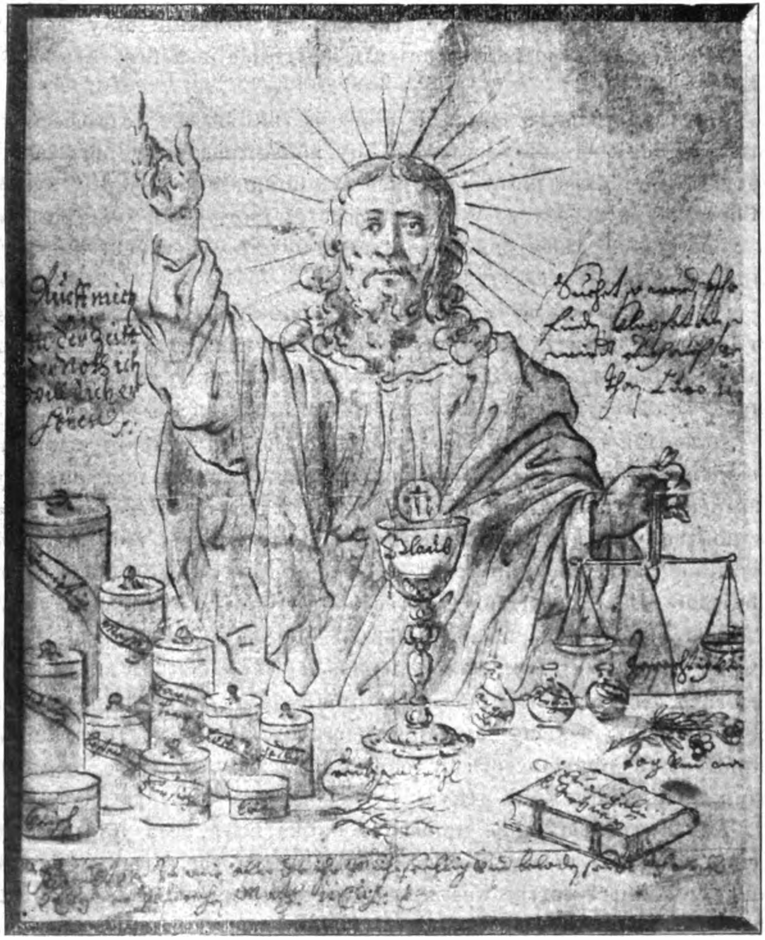
what soon becomes history. The writer was never more surprised than to learn in this instance the importance of newspaper accounts as historical documents. If it were not for the files of the Milwaukee newspapers, the story of the first pharmaceutical legislation in Wisconsin could never have been correctly told.

On another occasion (No. 7) the writer was again forced to give the newspapers greater credit as recorders of historic events than we commonly are accustomed to give them. This time the cause was the study of local pharmaceutical legislation in New York City only a few years before the Milwaukee episode. A comparison of the records in the pharmaceutical press of that period with the New York daily press, showed the former to be entirely inadequate and unreliable for historic purposes.

While the events alluded to were primarily of local import, yet both possessed national significance. Both are valuable chapters in the history of new world civilization.

We read with interest the historical work which the late Professor Flückiger did during his vacations while travelling about Europe. It is true we may not find old manuscripts to edit or historic pharmacies to describe, but if we keep our eyes open we may collect data that are as valuable to the future historian of American pharmacy as the historical essays of Professor Flückiger will be to the pharmaceutical historian at large. It is local detail work of this kind that must be done for years to come in every state of this Union before a general history of pharmacy of our country can be written. Where are the men of moderate leisure who have an inclination to look backward? Let them come forward and may they not fail to to consult the files of their local newspapers in order to fortify their memories. The writer knows of one veteran druggist in this country who has become so enthusiastic over newspaper work of this kind that he is not infrequently inclined to neglect his business. Glance over the old files of your newspapers and experience for yourself how interesting their accounts become twenty-five and fifty years after they have been printed.

"O the gifts the gods might gie us to see ourselves as others see us." This prayer of Burns has often been quoted by pharmacists at banquets and on other extraordinary occasions. If the newspaper editor sees us from a point of view not our own a communication is often quick to follow. While we may become displeased at newspaper comment, we rarely pay any attention whatever to literature that is less ephemeral than the press. The characterization of the apothecary in literature might well receive more attention than it has in the past. Such a study might not only prove profitable, it certainly would soon develop into a most delightful passtime.



Christ as Apothecary.

Not only do we find a pharmaceutical character in one of the earliest attempts of the printer's art (No. 4), but modern fiction contains many illustrations of the literateur's conception of pharmacy and the pharmacist. For several years past, the writer has been collecting everything along this line that has come to his attention. As soon as possible a "Bibliography of the apothecary in literature" will be published in order that the writer's attention may be drawn to the numerous omissions that are inevitable in a first attempt of this kind.

Closely associated with this phase is that of the "Apothecary in art." While there may be few, if any, masterpieces dealing with this subject, there exist paintings which are unique if not highly artistic. "Christ as apothecary" is the subject of more than one painting. A catalogue of these has been attempted (No. 5), which, no doubt, is incomplete.

No less interesting is the subject of book-plates, a phase in minor art. So far, the writer has succeeded in collecting eight pharmaceutical book-plates. (No. 6.) Many others certainly exist and it is hoped that they may be brought to the notice of the writer.

Attention has already been called to the fact that direction may be given to our general reading by searching for pharmaceutical characters in fiction and in other forms of general literature. There is another class of literature, suitable for general reading, which contains many an important statement that is now lost to the pharmaceutical historian. Reference is here had to books of travel.

Among the things that often attract the intelligent and wide awake traveller are those of pharmaceutical import. While these are recorded they are often burried in hundreds of pages of other matter of no direct bearing to pharmaceutical history. It will take hundreds of pharmaceutical readers to excavate these fragments from their printer's ink graves.

At the present time numerous books have been and are still being published or republished pertaining to the Mississippi valley and the country to the west. Let every pharmacist who is interested in this class of literature be certain to be provided with pencil and paper while reading. Every scrap of information thus gathered should be made available to the historian of the future. (See No. 8 in a subsequent issue.)

Books on foreign travel, especially in countries inhabited by semicivilized people or by races still in a state of nature often contain bits of information that will ultimately prove valuable. The history of what might be called the pharmacy of these primitive peoples may be not written for some time to come. A first attempt to gather such information as can be had should certainly be made in the near future. Small contributions from a host of readers are called for in order to make even such a preliminary undertaking possible.

The appended list by no means contains every fragment of an historical nature penned by the writer. Reviews of historical treatises, biographies etc. have all been omitted. As stated in the beginning, the list is published as an object lesson. That it may induce others to develop a systematic habit of recording historical matters which they happen across in their general reading is the sincere wish of the writer, also that at least a few may develop the habit of the collector and experience his joys over finds no matter how trifling.

1. Common salt mixture. Ph. Rev., 14, p. 107.

   A description of two packages of disinfectant such as were used at Camp Randal, Madison, Wis., during the Rebellion. One of these had been put up by the U. S. Army Laboratory, the other by E. R. Squibb.

2. Early phases in the development of pharmaceutical legislation in Wisconsin. Ph. Rev., 15, pp. 201, 223, 240; 17, pp. 56, 136, 183, 223. Reprinted in pamphlet form, pp. 43, by the Pharmaceutical Review Publ. Co. of Milwaukee.

   A collection of documents with brief comments. With the aid of newspapers and the records of the common council of Milwaukee it was made possible to give an account of the history of the first local pharmaceutical legislation which served as a stepping stone to state legislation a few years later.

3. The letter A: its meaning in pharmaceutical literature. Ph. Rev. 18, pp. 112 and 349.

   A preliminary report of a larger compilation ultimately to include all of the letters of the alphabet.

4. The apothecary and the German Totentänze. Ph. Rev., 18, p. 290.

5. Christ as apothecary. Ph. Rev., 18, p. 338; ibidem 19, p. 18.

6. Ex Libris.

   Reproductions of pharmaceutical book-plates: that of the Swiss Pharm. Society (Ph. Rev., 18, p. 440); Pharmaceutical Institute of the University of Bern (ibidem, 18, p. 484); of Prof. A. Tschirch of Bern (ibidem, 19, p. 95); of Dr. Oesterle of Bern (ibidem, p. 239); of Dr. E. O. Merk of Darmstadt (ibidem, 21, p. 457; of Dr. Louis Merk of Darmstadt (ibidem, p. 458).

7. Pharmaceutical legislation in New York during the early seventies. Ph. Rev., 21, p. 482; 22, p. 31.

One of the principal objects of publishing these documents was to bring out, if possible, other documents that might be hidden, and to induce those who lived through this episode to write their reminiscences of the period after a perusal of the editorials and communications which were written while feeling ran high.

Concentrated Nitrous Ether.

We manufacture a very superior article for the extemporaneous preparation of Sweet Spirit of Niter. 1 part of our Conc. Ether to 21 parts of Alcohol will produce a Spirit of Nitrous Ether answering the requirements of the U. S. P.

SPECIFY "M. C. W."

MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS **NEW YORK**

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

Enlarged and Thoroughly Revised

Culbreth's Materia Medica and Pharmacology

THIRD EDITION

Comprising all Organic and Inorganic Drugs which are and have been official in the United States Pharmacopoeia, together with important Allied Species and Useful Synthetics.

By DAVID M. R. CULBRETH, M. D.

Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools, Baltimore.

Octavo, 905 pages, with 478 illustrations
Cloth, $4.75 net

For sale by all dealers in Medical Books or sent carriage paid to any address on receipt of price.

LEA BROTHERS & CO.
Publishers
706-8-10 Sansom Street **111 Fifth Avenue**
PHILADELPHIA **NEW YORK**

LIVERPOOL, England.

To let on Lease or on Sale, large New Premises will be built suitable for Medical Specialties, right among doctors. Apply J. Price, 77 Lord Street, Liverpool, England.

BLOCKI'S

IDEAL Perfumes IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

RIDER AGENTS WANTED

in each town to take orders for our new High Grade Guaranteed Bicycles.

New 1903 Modols

"Bellise,"	Complete	***$8.75***
"Cossack,"	Guaranteed High Grade	***$10.75***
"Siberian,"	A Beauty	***$12.75***
"Neudorf,"	Road Racer	***$14.75***

no better bicycle at any price.

Any other make or model you want at one-third usual price. Choice of any standard tires and best equipment on all our bicycles. *Strongest guarantee.*

We ***SHIP ON APPROVAL*** C. O. D. to any one *without a cent deposit* and allow **10 DAYS FREE TRIAL** before purchase is binding.

500 Second Hand Wheels taken in trade by our Chicago retail stores, all makes and models, good as new............ **$3 to $8**

ESTABLISHED 12 YEARS

DO NOT BUY a bicycle until you have writen for our FACTORY PRICES AND FREE TRIAL OFFER.

Tires, equipment, sundries and sporting goods of all kinds, at half regular price, in our big free sundry catalog. Contains a world of useful information. Write for it.

J. L. MEAD CYCLE CO., Chicago, Ill.

The Open Court

AN ILLUSTRATED MONTHLY MAGAZINE

D.voted to the Science of Religion, The Religion of Science and the Extension of the Religious Parliament Idea.

10 cents per copy - - - - - - $1.00 per year

SCIENCE is slowly but surely transforming the world. Science is knowledge verified; it is Truth proved; and Truth will always conquer in the end. The power of Science is irresistible. Science is the still small voice; it is not profane, it is sacred; it is not human, it is superhuman; Science is a divine revelation.

Convinced of the religious significance of Science, *The Open Court* believes that there is a holiness in scientific truth which is not as yet recognized in its full significance either by scientists or religious leaders. The scientific spirit, if it but be a genuine devotion to Truth, contains a remedy for many ills; it leads the way of conservative progress and comes not to destroy but to fulfil.

The Open Court on the one hand is devoted to the *Science of Religion;* it investigates the religious problems in the domain of philosophy, psychology, and history; and on the other hand advocates the *Religion of Science.* It believes that Science can work out a reform within the Churches that will preserve of religion all that is true, and good, and wholesome. Sample copies of *The Open Court* sent on request together with illustrated catalogue of important publications for the Study of Religion. Published by

THE OPEN COURT PUBLISHING COMPANY, 324 Dearborn St., Chicago.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

NEW NOVELS.

e day of the dog, by George Barr McCutcheon. (Dodd, Mead)	$1.25
r Mortimer, by Mary Johnston. (Harpers)	1.50
y Mamie Rose, by Owen Kildare. (Baker & Taylor) Net	1.50
lie, a Mennonite maid, by H. R. Martin. (Century)	1.50
e crossing, by Winston Churchill. (Mac Millan Co.)	1.50
e seiners, by James B. Connolly. (Chas. Sribner's Sons)	1.50
relyn Byrd, by George C. Eggleston. (Lothrop)	1.50
ave hearts, by W. A. Fraser. (Chas. Scribner's Sons)	1.50
e Barrier, by Allen French. (Doubleday, Page & Co.)	1.50
e light of the star, by Hamlin Garland. (Harpers)	1.50
e singular Miss Smith, by Florence Morse Kingsley. (MacMillan)	1.25
he faith of men and other stories, by Jack London. (McClure, Phillips)	1.50
snare of love, by Arthur W. Marchmont. (Stokes)	1.50
uvver Jim's baby, by Philip V. Mighels. (Harpers)	1.50
e Villa Claudia, by John A. Mitchell. (Life)	1.50
ına the adventuress, by E. Phillips Oppenheim. (Little, Brown)	1.50
ed in the bone, by Thos. Nelson Page. (Chas. Scribner's Sons)	1.50
e cost, by David Graham Phillips. (Bobbs-Merrill Co.)	1.50
e flame-gatherers, by Margaret Horton Potter. (MacMillan)	1.50
e by-ways of Braithe, by Frances Powell. (Chas. Scribner's Sons)	1.50
ort Amity, by A. T. Quiller-Couch. (Chas. Scribner's Sons)	1.50
he castaway, by Hallie Erminie Rives. (Bobbs-Merrill) Net	1.00
e bright face of danger, by Robert Neilson Stephens. (Page)	1.50
gingham rose, by Alice Woods Ullman. (Bobbs-Merrill)	1.50
e descent of man, and other stories, by Edith Wharton. (Chas. Scribner's Sons)	1.50
ings and Queens I have known, by Helene Vacaresco. (Harpers) Net	2.00
e Republican Party, by Francis Curtis. 2 vols. (Putnams) Net	6.00
uman work, by Charlotte Perkins Gilman. McClure, Phillips) Net	1.50
orking with the hands, by Booker T. Washington. (Doubleday, Page) Net	1.50
ldresses and Presidential messages, by Theodore Roosevelt. (Putnams)	1.25
New Hampshire, by Frank B. Sanborn. (Houghton, Mifflin) Net	1.10
The mystic mid-region; the deserts of the Southwest, by Arthur J. Burdick. (Putnams) Net	2.00
Whittier-land, by Samuel T. Packard. (Houghton, Mifflin) Net	1.00
Olive Latham, by E. L. Voynich. (Lippincotts)	1.50
The woman errant, by the author of "The garden of a commuter's wife. (MacMillan)	1.50
The grafters, by Francis Lynde. (Bobbs- Merrill)	1.50
The second Mrs. Jim, by Stephen Conrad. (Page)	1.00
The givers, by Mary E. Wilkins Freeman. (Harpers)	1.25
In search of the unknown, by Robert W. Chambers. (Harper)	1.50
A Texas matchmaker, by Andy Adams. (Houghton, Mifflin)	1.50
Later adventures of Wee McGregor, by J. J. Bell. (Harper)	1.25
The daughters of desperation, by Hildegarde Brooks. (McClure, Phillips)	1.25
The queen's quair, by Maurice Hewlett. (MacMillan)	1.50
The Merry Ann, by S. Merwin.(MacMillan)	1.50
Saïd, the fisherman, by M. Pickthall. (McClure, Phillips)	1.50
Order No. 11, by C. A. Stanley. (Century)	1.50
A woman's will, by Anna Warner. (Little, Brown)	1.50
The rainbow chasers, by J. H. Whitson. (Little, Brown)	1.50
The Test, by M. T. Wright. (Scribners)	1.50
Sally of Missouri, by R. E. Young. (McClure, Phillips)	1.50
Uncle Mac's Nebrasky, by W. R. Lighton. (Holt)	1.25
The shame of the cities, by Lincoln Steffens. (McClure, Phillips) Net	1.20
By the fireside, by Chas. Wagner. (McClure, Phillips) Net	1.00
Nancy Stair, by Elnior M. Lane. (Appletons)	1.50
Nature's comedian, by W. E. Norris. (Appletons)	1.50
My li'l' Angelo, by Anna Y. Condict.(Appletons)	1.25
Man and Superman, by G. Bernard Shaw. (Brentanos) Net	1.25
Elizabeth's adventures in Rügen. (MacMillan)	1.50
The Penobscot man, by Fannie H. Eckstorm. (Houghton, Mifflin)	1.50
The great adventurer, by Robert Shackelton. (Doubleday, Page)	1.50
Bird center cartoons, by John T. McCutcheon. (McClure) Net	1.25
The highroad, being the autobiography of an ambitious mother. (Stone)	1.50
The issue, by George Morgan. (Lippincotts)	1.25
The double garden, by Maurice Maeterlink. (Dodd, Mead) Net	1.40

BAEDEKER'S GUIDE BOOKS.

Illustrated with numerous Maps, Plans, Panoramas and Views.

12 mo., cloth flexible. Prices are net.

e United States. With an Excursion into Mexico. (New Edition)	$3.60
nada. (New Edition)	1.50
stria	2.40
stern Alps	3.00
ypt	4.50
ance (Northern)	2.10
rmany (Northern)	2.40
rmany (Southern)	1.80
eat Britain	3.00
eece	2.40
ly. Northern	2.40
Italy, Central, and Rome	2.25
Italy, Southern, and Sicily	1.80
London and its Environs	1.80
Norway, Sweden, and Denmark	2.40
Palestine and Syria	3.60
Paris and its Environs	1.80
Rhine	2.10
Switzerland	2.40

Postage additional about 10%.

Stedman, Complete Pocket-Guide to Europe. Flexible Leather, postpaid	$1.50

GRANT ALLEN'S HISTORICAL GUIDES.

ris, by Grant Allen	$1.25
orence, by Grant Allen	1.25
ties of Belgium, by Grant Allen	1.25
Venice, by Grant Allen	1.25
Cities of Northern Italy, by G. C. Williamson	1.25
Umbrian Towns, by Mr. & Mrs. J. W. Cruickstank	1.25

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,
MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

EXTRACT OF BEEF
MADE ACCORDING TO PROCESS OF
PROF. JUSTUS VON LIEBIG.
FROM FRESH BEEF OF PRIME QUALITY
GUARANTEED PURE.
A quarter of a teaspoonful dissolved in a cup of boiling water produces instantly a strong beef tea or bouillon of excellent flavor
Add a little salt, or celery salt
MANUFACTURED BY
URUGUAY BEEF CO.
GENERAL OFFICES
HAMBURG, GERMANY
SOLE AGENTS FOR THE UNITED STATES OF AMERICA
LEHN & FINK
NEW YORK
MADE IN URUGUAY

Uruguay Beef Extract

IMPORTED FROM SOUTH AMERICA.

Quality unsurpassed by any other brand, foreign or domestic. Besides possessing all the stimulating and nutritive properties of a high grade Beef Extract, it is sold at a price which allows dealers

A Liberal Margin of Profit.

To commend Uruguay Beef Extract to fastidious people, it is put up in porcelain jars fitted with porcelain cover, closed by means of an aluminum ring.

LEHN & FINK, NEW YORK.
Sole Importers.

FORMIN. Hexamethylene-tetramine Merck. Presents this ideal urinary antiseptic in its highest obtainable purity. In powder form, or *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectant. Used the world over. Beware of imitations, which are poisonous and at the same time possess less disinfectant power. See that the signature of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable that the real virtues of cod-liver oil reside in an active principle or principles. Gaduol is the alcoholic extract of the active principles of cod-liver oil. It produces a stimulant and alterative effect on the processes of nutrition and absorption, and does not disturb the appetite or affect the stomach. A wine of cod-liver oil prepared from Gaduol is a favorite tonic and has a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of many babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK.

Merck & Co., New York.

Further information on application.

PHARMACEUTICAL REVIEW.

FOUNDED IN 1882 BY
DR. FREDERICK HOFFMANN.
EDITED BY
DR. EDWARD KREMERS
WITH THE CO-OPERATION OF

Prof. J. H. **Beal**, Professor of Applied Pharmacy, Pittsburg College of Pharmacy.
Prof. **Chas. Caspari Jr.**, Professor of Pharmacy, Maryland College of Pharmacy.
Prof. **Virgil Coblentz**, Professor of Chemistry and Physics, New York College of Pharmacy.
Dr. R. **Fischer**, Assistant Professor of Practical Pharmacy, University of Wisconsin.
Prof. H. **Kraemer**, Ph. D., Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy.
Prof. J. U. **Lloyd**, Professor of Chemistry, Cincinnati Eclectic Medical Institute, and Pharmaceutical Manufacturer.
Dr. A. B. **Lyons**, Pharmaceutical Chemist, Detroit, Mich.
Dr. F. B. **Power**, Director of the Wellcome Research Laboratories, London, England.
Prof. A. B. **Prescott**, M. D., L. L. D., Professor of Chemistry and Dean of the School of Pharmacy, Ann Arbor, Mich.
Prof. W. A. **Puckner**, Professor of Chemistry, University of Illinois School of Pharmacy.
Prof. J. O. **Schlotterbeck**, Ph. D., Professor of Pharmacognosy, University of Michigan.
Prof. **Wm. Simon**, Ph. D., Professor of Chemistry, Maryland College of Pharmacy, and Baltimore College of Physicians and Surgeons.
Prof. A. B. **Stevens**, Professor of Pharmacy, University of Michigan.
Dr. R. H. **True**, Division of Agriculture, Washington, D. C.

Published by PHARMACEUTICAL REVIEW PUBL. CO., MILWAUKEE, WIS.
Agent for Europe: JULIUS SPRINGER, BERLIN.

Entered at the Post Office at Milwaukee, Wis., as second class matter.

Vol. 22, No. 12. DECEMBER, 1904.

Subscription Price Per Year:
UNITED STATES & CANADA, $2.00.
UNIVERSAL POSTAL UNION, $2.50.

JANUARY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

FEBRUARY.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE.

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday.	*Monday.*	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JULY.

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

AUGUST.

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER.

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 30	24 31	25	26	27	28	29

NOVEMBER.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TABLE OF CONTENTS.

Editorial 437
Practical versus theoretical mathematics in gas analysis. By *A. B. Lyons* 440
Practical as well as thoretical mathemotics in gas analysis. By *I. W. Brandel* 445
Reactions of cinchona alkaloids. By *A. B. Lyons* 445
The oxymethylanthraquinone drugs and their assay. By *A. Tschirch* 447
Proposed changes in the U. S. P. By *Edward Kremers* 455
American pharmaceutical colleges and schools. By *Wilbur Scoville* 458
The study of phytochemistry. By *Edward Kremers* 465
Books reviewed 466

...Get Ready...

Waiting till a thing is called for before ordering generally means missing the first sale.

You may not have had a call for Alphozone yet—but if a prescription for it should come in to-day, could you fill it?

Best way is to keep Alphozone on hand. Only a question of a short time till most doctors use it, for we are daily convincing scores of them that it is in all respects the best germicide known to modern science.

Your jobber can supply you, or we will, at $4.50 per oz.

Frederick Stearns & Co.,
DETROIT, MICH., U. S. A.

STEARNS QUALITY

WINDSOR, ONT.
LONDON, ENG.
NEW YORK CITY.

Concentrationen oder Resinoide.

Unsere Firma gehört zu den ersten und ältesten, welche diese Klasse von Producten von amerikanischen Drogen eingeführt haben und im *grössten Massstabe fabriciren.*

Correspondenz wird erbeten und jede Auskunft über die Producte unserer Fabrik sowie über amerikanische Drogen wird bereitwilligst ertheilt.

LLOYD BROTHERS, Cincinnati, O., U. S. A.

WHITE METAL GOODS for Druggists, Manufacturing Pharmacists, Perfumers etc. Descriptive Catalogue mailed on application.

A. H. WIRZ,
913-917 Cherry St.,
PHILADELPHIA, PA.

FRITZSCHE BROTHERS,

37 Barclay Street, - NEW YORK.

BRANCH OF

SCHIMMEL & CO.,

LEIPZIG. LONDON. BODENBACH (AUSTRIA).

MANUFACTURERS OF

Essential Oils and Aromatic Products

For Pharmacists, Druggists, Perfumers, Soapmakers and Distillers.

TYPICAL PURE AND RARE ESSENTIAL OILS

— FOR —

Scientific Experiments, Analyses and Collections.

SPECIALTIES:

Anethol, Citral, Eucalyptol, Eugenol, Linalool, Menthol, Safrol, Terpineol, Thymol, Genuine Oil of Bitter Almonds, German Rose Oil, Rose Pomade and Rose Water, Turkish Rose Oil, Liquid, *free from Stearopten,* Genuine Oil of Mustard Seed. Oil of Guaiac Wood.

SYNTHETIC PRODUCTS:

Aubepine (anisic aldehyde), Cumarin, Heliotropin, Lilacine, Nerolin, Vanillin, Oil of Wintergreen, *Guaranteed Strictly Pure for Medical Use.* Oil Cassia "Schimmel & Co.", Oil Hyacinth "Schimmel & Co.", Oil Jasmine "Schimmel & Co.", Oil Neroli "Schimmel & Co.", **Oil Rose, artificial, "Schimmel & Co."**

PRIZES AWARDED:

International Pharmaceutical Exhibition, Vienna, 1883,
DIPLOMA OF HONOR, FIRST PRIZE.

HYGIENIC EXHIBITION, BERLIN, 1883,
GOLD MEDAL of the Empress Augusta of Germany.

INTERNATIONAL EXHIBITION, BARCELONA, 1889.
GOLD MEDAL.

TEPLITZ, 1879,
LARGE GOLD MEDAL.

AMSTERDAM, 1889,
LARGE GOLD MEDAL.

MOSCOW, 1872,
LARGE GOLD MEDAL.

VIENNA, 1873.
MEDAL OF PROGRESS.

VIENNA, 1883.
DIPLOMA OF HONOR (Highest Award).

Etc., Etc., Etc.

ENDERMOL

neutral, bland, odorless,
stable, mollient, penetrating,

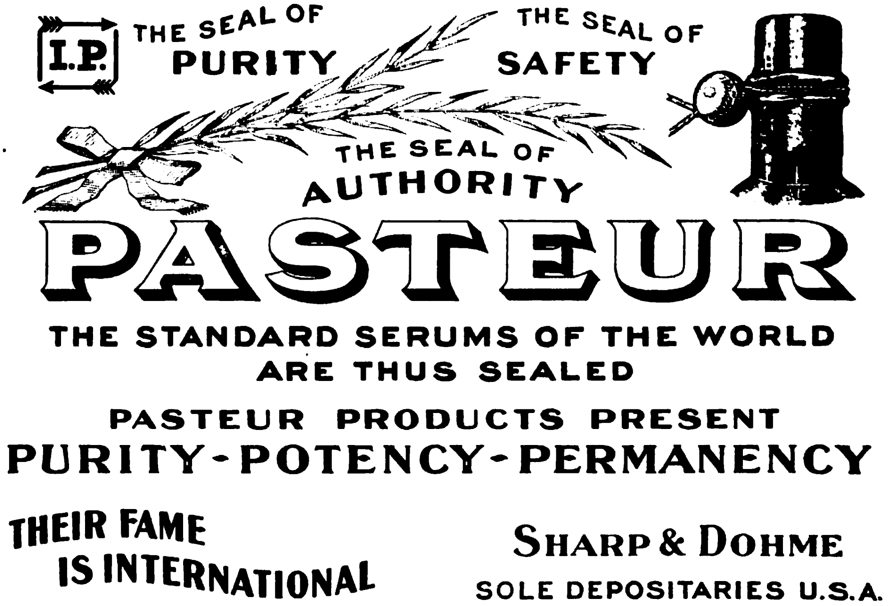
MAKES

**Smooth Ointments
with all Drugs**

1-lb. tins, 50c. per lb.
5-lb. tins, 45c. per. lb.

Send for literature.

SCHERING & GLATZ,
NEW YORK.



I.P.

THE SEAL OF PURITY

THE SEAL OF SAFETY

THE SEAL OF AUTHORITY

PASTEUR

THE STANDARD SERUMS OF THE WORLD
ARE THUS SEALED

PASTEUR PRODUCTS PRESENT
PURITY-POTENCY-PERMANENCY

THEIR FAME
IS INTERNATIONAL

SHARP & DOHME
SOLE DEPOSITARIES U.S.A.

TO PROTECT THE DRUGGIST AGAINST ADULTERATION AND SOPHISTICATION

TO FACILITATE DISPENSING

Phenacetin

...IS ALSO SUPPLIED IN...

5-Grain Dose Powders

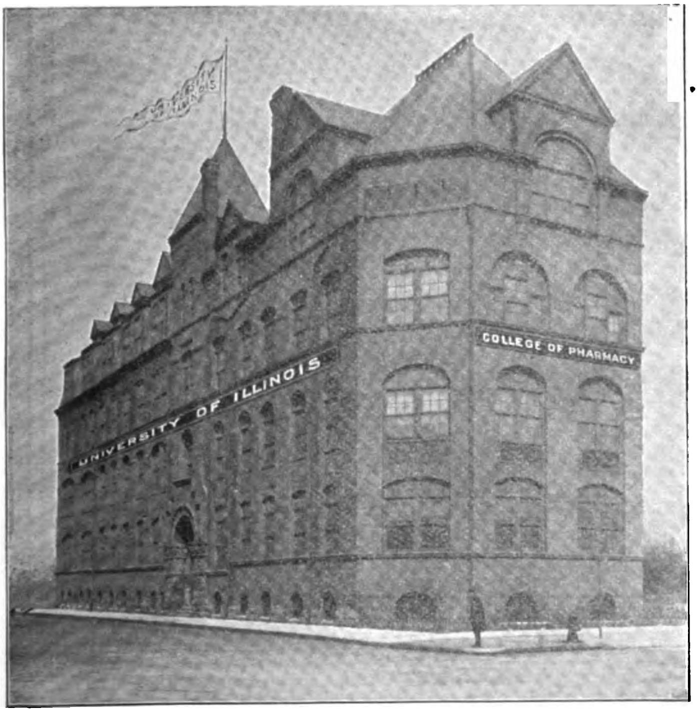
(6 Powders in a Box, 15 Boxes in a Carton)

CONVENIENT RELIABLE
ATTRACTIVE TIME-SAVING

Price the same as in one ounce bulk cartons

When ordering Phenacetin from your jobber always include
DOSE POWDERS

FARBENFABRIKEN OF ELBERFELD CO.,
40 Stone Street, NEW YORK



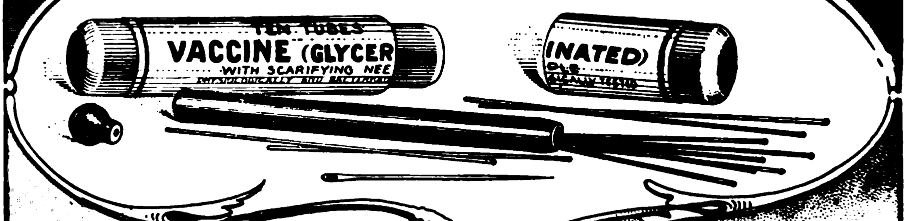
University of Illinois School of Pharmacy

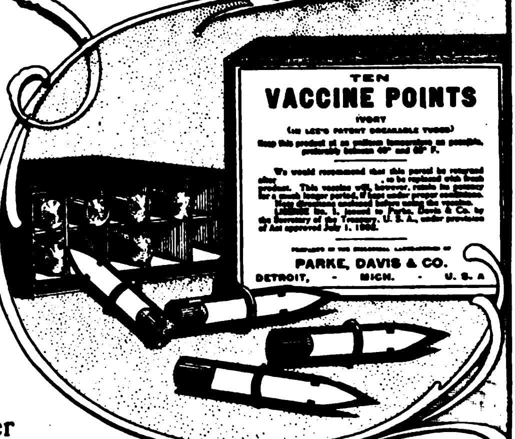
(Chicago College of Pharmacy 1859—1896)

Now occupies a five-story building at the corner of Michigan Boulevard and Twelfth St., opposite Grant Park,—an ideal location for school purposes. The building affords nearly fifty thousand square feet of floor space and contains four lecture halls and six large laboratories. Forty-fifth annual session begins Sept. 27th. For announcement address

W. B. DAY, Actuary,
Michigan Ave. and 12th Street,
CHICAGO, ILL.

VACCINE
(GLYCERINATED)
BACTERIOLOGICALLY & PHYSIOLOGICALLY
TESTED





KEEP IT IN STOCK

Parke, Davis & Co.'s Vaccine is pure and active.

It has the favor of physicians to an extent unknown to any other virus.

It is the most extensively advertised and best selling vaccine in the world.

NET PRICES.

Capillary Glass Tubes (hermetically sealed), per box of ten, 60 cents; per box of three, 20 cents.

Ivory Points (each in a Lee's breakable glass case), per box of ten, 60 cents.

PARKE, DAVIS & COMPANY

LABORATORIES: Detroit, Mich., U.S.A.; Walkerville, Ont.; Hounslow, Eng.

BRANCHES: New York, Chicago, St. Louis, Boston, Baltimore, New Orleans, Kansas City, Indianapolis, Minneapolis, Memphis; London, Eng.; Montreal, Que.; Sydney, N.S.W.; St. Petersburg, Russia; Simla, India; Tokio, Japan.

Pharmaceutical Review.

VOLUME 22. DECEMBER, 1904. NUMBER 12.

When the **prerequisite clause** was discussed by the New York Pharmaceutical Association, its endorsement by that body was greeted as the night traveler might greet the bright morning star before the dawn of day. When this same clause became law, it was referred to as marking a new era not only in pharmaceutical legislation, but in education as well.

One of the best features of the clause enacted is the so-called "twelve regents' counts" which struck at the gravest evil of the present situation, namely the poor elementary education of the average applicant for admission to the college of pharmacy.

That the prerequisite clause should be attacked, as previous to its enactment as a law it was opposed, was to be expected. That the colleges of New York should regard twelve regents' counts as too high a standard for admission comes as a painful surprise. Let us hope that they have not been reported correctly, for the following account does not appear to admit of a different interpretation:

> "At the very outset, when the conferees began to figure out what subjects should be required in 12 counts, it was found that the regents do not give any counts on elementary subjects which representatives of the schools considered absolutely essential. It was found that the regents gave counts only on the higher branches of these subjects — far beyond the knowledge of the average pharmacy student who would apply to the Board of Pharmacy for examination. It developed that what was really wanted and intended as a prerequisite requirement was an elementary knowledge of such subjects as arithmetic, geography, spelling, grammar, writing, etc., but the regents give no counts for such elementary knowledge and could no do so without changing the methods and system followed for years. It was found impossible to definitely fix upon subjects which should be required in the 12 counts."

For a group of colleges favored by a prerequisite clause to come forward with a statement that little more than a knowledge of the three R's is wanted, that the subjects taught at a high school or academy are too far advanced, when colleges of medicine and law can demand a bachelor's degree representing eight years of general preparation where these colleges have demanded none whatever, seems too discouraging to be true.

Colleges making application to the Department of Education for recognition must comply with the following standard:

"$500 as the value of the apparatus and equipment; not less than three professors regularly employed in giving instruction; practical work in not less than three laboratory courses, namely, chemistry, pharmacy, materia medica; seventeen years the minimum age for graduation from a pharmacy school and satisfactory evidence of a good moral character; the minimum course of instruction for any one year must not be less than twenty-five weeks of fifteen hours per week; at least two months must intervene between the closing of the first year and the opening of the second year of the course.

"These requirements were adopted with two principles in view, not to discriminate against the pharmacy schools of New York State, and the practice and application of the medical statute by the Board of Regents."

While there are certain surprising features about some of these requirements, let us welcome them as an advance upon no requirements of the past. As stated in connection with a similar action of the Conference of Pharmaceutical Faculties, the requirements are so humiliatingly low, that the colleges of New York will have to look toward a higher standard if for no other reason than to avoid unfavorably comparison and comment.

While some of the recent reports from New York are not of such a nature as we had hoped for, an unexpected and welcome surprise has come from Ohio to counteract any despondency that might be caused by the unwelcome news from the far East. Although not favored by a prerequisite clause, the **Ohio Board of Pharmacy** has anticipated the good effects from the future enactment of such legislation by issuing the following circular:

COLUMBUS, O., October 15, 1904.

In order to meet the demand for better educated pharmacists, and to provide a uniform and equitable standard of education in Pharmacy, the Ohio Board of Pharmacy, on October 13, 1904, adopted the following:

Requirements for Admission to Schools and Colleges of Pharmacy.

Resolved, That on and after July 1st, 1905, no school or college of pharmacy shall be recognized as in good standing by the Ohio Board of Pharmacy, which does not require of all applicants as a minimum condition of admission, a common school education, or the equivalent thereof, which shall include one year in a High School of first grade (Ohio), or an academy, legally constituted, providing a course of study of not less than four years.

Provided, That nothing in this resolution shall apply to students who have matriculated previous to November 1st, 1904, in any school or college of pharmacy heretofore recognized as in good standing by the Ohio Board of Pharmacy.

Requirements Demanded of Schools or Colleges of Pharmacy.

Resolved, That on and after July 1st, 1905, every school or college of pharmacy shall comply with the following requirements as a condition of being recognized as in good standing by the Ohio Board of Pharmacy:

1. It shall exact the requirements for Admission to Schools and Colleges of Pharmacy adopted by the Ohio Board of Pharmacy. (Oct. 13, 1904.)
2. It shall possess an adequate equipment for teaching pharmacy in all its branches, including laboratory facilities and apparatus.
3. It shall have an adequate and competent faculty for instruction in the following branches—Pharmacy, Chemistry, Materia Medica, Microscopy, Physiology and Botany.
4. It shall require an attendance of 80 per cent. upon two graded courses of instruction, in branches specified (in article 3) of not less than twenty-six weeks each, excluding holidays, in two separate years.
5. It shall exact an average grade of 75 per cent. on examination as a condition of graduation.
6. It shall admit students within thirty days after the opening of any school year, and it shall confer degrees in pharmacy only at the close of each school year upon the completion of the prescribed course of study.
7. Any college may honor official credentials issued by other colleges of pharmacy in good standing as determined by this Board, so far as the work offered is the equivalent of or identical with the required work of the school to which credentials are presented, except in branches of study embraced in the last year of its own curriculum.

The action reported in the above circular shows what Boards of Pharmacy can do if their members have the courage of their convictions. We congratulate Ohio upon the Board of Pharmacy it has. Let us also hope that other boards will be stimulated to similar action. While in our opinion some of the above requirements are subject to just criticism, this action by a state board is even more encouraging than the passage of the prerequisite clause in New York for it indicates courage where it is most needed and effective.

Practical Versus Theoretical Mathematics in Gas Analysis,

By *A. B. Lyons.*

The assay of spirit of nitrous ether by the use of the nitrometer is an exceedingly simple operation, requiring a very short time and involving no special skill in manipulation. The only difficulty connected with it arises from the fact that, to obtain exact results, proper allowance must be made for variation in the volume of the gas obtained with variations in temperature and in barometric pressure. The paragraph in the U. S. Pharmacopoeia of 1890 which treats of the use of the instrument ignores the latter as of minor consequence, and furnishes a table giving the amount of expansion which a gas undergoes by warming, making the unit the volume of the gas at 0° C. The actual weight of 1 cc. of nitrogen "dioxide" (**NO**) at 0° C. and at 25° C. is also given. From these data it is possible to calculate the weight of the gas at the temperature of the experiment. The calculation is simple onough. If in a given experiment 27.3 cc. of gas have been obtained, the temperature of the room being, throughout the experiment, 21.5° F., the weight of the gas will be $0.0013423 \times 27.3 \div \frac{1.076923 + 1.080586}{2}$, or about 0.03397 gm. It must be admitted, however, that, even if one dispense with some of the decimals, the figuring imposes something of a burden on the operator, and if he is not "good at figures," he will not feel quite confident that he has not made some slip that vitiates his result.

If he fully understands the subject in hand, he will know, also, that the correction for barometric pressure is likely to be at least as large as that for temperature, and for this he will find no provision whatever in the pharmacopoeial account of the test. If he does not become discouraged by this omission he will resort to some text book on physical measurements for a formula, and will learn that $w' = \frac{w}{1+0.003665t} \times \frac{b}{760}$, where w′ is the actual weight of 1 cc. of the gas under the conditions of the experiment, w, the weight of the same at 0° C., 760 mm. pressure, and b the atmospheric pressure (reading of barometer, corrected for temperature, not reduced to sea level). He will learn further that since the gas is in a moist condition an arbitrary correction may be introduced by changing 0.003665 in the formula to the simpler 0.004. Armed with this formula he will deduce from his observation a correct result, the mathematical operation being as follows (assuming the barometric pressure to be 28.7 in. by compensated aneroid, the remaining data as before): $w' = \frac{0.0013428}{1+(27.5 \times 0.004)} \times \frac{729}{760} = \frac{0.0013428}{1.11} \times \frac{729}{760} = 0.00115995$ and the weight of 27.3 cc. will be 0.0316666+, or for practical purposes 0.03167.

The theoretical mathematician will rest satisfied with his result and with the method of obtaining it. The practical man will chafe over the labor required, and will fear also that some fatal error may have slipped into the calculation somewhere, not easy to detect except by laboriously repeating the work. He will find fault with the temperature standard of 0° C., pointing out the increased liability to error from the magnitude of the correction involved. The standard temperature, he will say, should be about that of an ordinary laboratory, somewhere near 25° C. He will advise that such a quantity of the article to be assayed should be taken as will give for each 0.1 per cent. of nitrite present, 1 cc. of gas at standard temperature (25° C.) and pressure (760 mm.), allowance being made for the moisture present in the gas. Then he will construct a table of correction factors (a) for temperature and (b) for barometrical pressure. Then, when his experiment has been made, all that he has to do is to multiply the volume of gas in cubic centimeters in succession by the two factors taken from the table. Further the practical mathematician will note the fact that the correction for temperature amounts to not far from 3⅓ per cent. for each 10 degrees C., additive, if the temperature is below 25°, subtractive, if above, while the barometer correction amounts to about 3⅓ per cent. for each inch (25 mm.). These are figures easily carried in the head, and are sufficiently exact for the purposes of such an assay. The chances are that the average pharmacist will come nearer the correct result by the use of such a simple correction formula as this than he will if he attempts to use the orthodox formula of the mathematician.

The formula given in the article on amyl nitrite published in a recent number of the *Review* is $\frac{P \times V \times 0.0131}{19M(1+0.003665t)}$*

It is evident at a glance that the formula is an approximate one, somewhat simplified by the adoption of the round number 19. The actual formula is $\frac{0.5284 \times P \times V \times 0.0013158}{M(1+0.003665t)}$ which may be simplified to $\frac{P \times V \times 0.00068869}{M(1+0.003665t)}$ this being still only an approximate formula. Since our ordinary standard temperature is 25° C. rather than 0° C., the formula should rather be $\frac{P \times V \times 0.00068093}{M(1 + 0.00388\, t')}$ in which $t' = t - 25$.

---

* In these formulas P = barometric pressure in mm.; V = volume of gas in cc.; M = weight in grams of the amyl nitrite and t = temperature centigrade.

Whichever one of the above formulas we adopt, the mathematical operation of reducing it in any given case seems formidable. It is evident from the column of corrected results that in the paper referred to, the mathematical drudgery was dodged by expedients not explained, and no fault, perhaps, is to be found with this, since the results obtained were sufficiently near the mathematical truth in an assay that cannot be expected to give results absolutely true.

The first experiment made gave a yield of gas measuring at 26° C., 742 mm. pressure, 27.4 cc., from 0.1764 gm. of amyl nitrite. By the formula, we must multiply 742 by 27.4 and this product by 0.0131, and divide the latter product by the product of 19 times 0.1764 multiplied by 1 increased by the product of 26 multiplied by 0.003665.

The method of the practical mathematician is to start with 0.4795 gm. of amyl nitrite, which, if the liquid were 100 per cent. "pure" would yield 100 cc. of gas under standard conditions. In as much, however, as the nitrometer usually has a gas capacity of only 50 cc., one half of this quantity will be taken, and the result multiplied by two. It will be objected that the exact weighing of such a quantity as 0.4795 gm. is a very difficult operation. The practical man admits this, but is ready with an expedient. He introduces into a tared 100 cc. measuring flask about 0.6 cc. of the nitrite and weighs this accurately. Suppose the weight is found to be 0.521 gm.; he solves the proportion 0.4795:0.521:100:x (i. e. he divides 52.1 by 0.4795) and finds x = 108.65+. He fills the measuring flask with alcohol exactly to the mark and adds 8.65 cc. more of alcohol. Of this solution, 10 cc. will contain exactly 0.4795 of amyl nitrite, and this quantity (or 5 cc., if his nitrometer has a capacity of only 50 cc.) he uses for his assay. Suppose that he obtains 74.25 cc. of gas (or, if 5 cc. of solution has been used 37.13 cc., which he multiplies by two); he has at once his uncorrected percentage of actual amyl nitrite. He has observed barometer and thermometer, finding the former to read 29.45 in. (748 mm.), the latter 20.3° C. This calls for a barometer correction for 29.92 − 29.45 = .47 in. (29.92 in. being the equivalent of 760 mm.) and for 4.7° temperature. By the rough and ready method above described this calls for a pressure correction of .47 ÷ 0.3 = 1.6% subtractive, and a temperature correction of 4.7 ÷ 3 = 1.6% additive, the two balancing one another.

If the corrections are made by aid of a table, we find the factors to be respectively, about 0.985 and 1.016, which multiplied together give 1.00076 as the (approximate) factor, making the result 74.31 per cent. When worked out by the last formula given above, the result is 74.24. These three results practically agree, since experimental errors are likely to introduce variations of more than 0.074 which is only one part in one thousand. A fourth result, practically identical with these may be reached by using the table for combined temperature and pressure corrections.

The nearest figure in this table is that for 750 mm. and 19°, viz. +0.8% to be diminished by 0.5% for the 1.5° (dif. between 19° and 20.5°) and diminished further by 0.27% for 2 mm. pressure (dif. between 748 and 750 mm.) the correction is therefore +0.8—0.5—0.27 or practically 0%.

There are two corrections that have not been taken into account in any of the foregoing methods of deducing results. The gas must contain some vapor of water, requiring a minus correction, and it is not wholly insoluble in the brine with which the nitrometer is charged, so that a plus correction should be made. These corrections are not large, and since they tend to neutralize one another, may well be ignored.

As a basis for calculating assays by nitrometer of nitrites, we may assume that at 25° C. and 760 mm. pressure, one cc. of nitric oxide weighs 0.00123 gm. This quantity of gas will be yielded by 0.004796 gm. of amyl nitrite, by 0.0030644 gm. of ethyl nitrite or by 0.002829 gm. of sodium nitrite.

Factors for Temperature Correction.

Centigrade.		Fahrenheit.			
Temperature.	Factor.	Temperature.	Factor.	Temperature.	Factor.
15°	1.035	59°	1.035	78°	0.998
16°	1.031	60°	1.033	79°	0.996
17°	1.028	61°	1.031	80°	0.994
18°	1.024	62°	1.029	81°	0.992
19°	1.021	63°	1.027	82°	0.991
20°	1.017	64°	1.025	83°	0.989
21°	1.014	65°	1.023	84°	0.987
22°	1.010	66°	1.021	85°	0.985
23°	1.007	67°	1.019	86°	0.983
24°	1.003	68°	1.017	87°	0.981
25°	1.000	69°	1.015	88°	0.980
26°	0.997	70°	1.013	89°	0.978
27°	0.993	71°	1.011	90°	0.976
28°	0.990	72°	1.009	91°	0.974
29°	0.987	73°	1.008	92°	0.972
30°	0.983	74°	1.006	93°	0.970
31°	0.980	75°	1.004	94°	0.969
32°	0.977	76°	1.002	95°	0.967
33°	0.973	77°	1.000		
34°	0.970				
35°	0.967				

Factors for Correction for Barometric Pressure.

Millimeters.		Inches.			
Pressure.	Factor.	Pressure.	Factor.	Pressure.	Factor.
790	1.039	31.2 in.	1.042	26.4 in.	0.882
780	1.026	31.0	1.036	26.2	0.876
770	1.013	30.8	1.029	26.0	0.869
760	1.000	30.6	1.022	25.8	0.862
750	0.987	30.4	1.016	25.6	0.855
740	0.974	30.2	1.009	25.4	0.849
730	0.961	30.0	1.003	25.2	0.842
720	0.947	29.8	0.996	25.0	0.836
710	0.934	29.6	0.990	24.8	0.829
700	0.921	29.4	0.983	24.6	0.822
690	0.908	29.2	0.976	24.4	0.816
680	0.895	29.0	0.969	24.2	0.809
670	0.882	28.8	0.962	24.0	0.802
660	0.868	28.6	0.955	23.8	0.795
650	0.855	28.4	0.949	23.6	0.789
640	0.842	28.2	0.942	23.4	0.782
630	0.829	28.0	0.936	23.2	0.776
620	0.816	27.8	0.929	23.0	0.769
610	0.803	27.6	0.922	22.8	0.762
600	0.789	27.4	0.916	22.6	0.755
590	0.776	27.2	0.909	22.4	0.748
580	0.763	27.0	0.902	22.2	0.741
570	0.750	26.8	0.895	22.0	0.735
560	0.737	26.6	0.889	21.8	0.728
550	0.724			21.6	0.722
				21.4	0.715

Table for Correction of Results for Temperature and Barometer.

Standards, 25° C. and 760 mm. pressure.*

Barometer.	13° C.	16° C.	19° C.	22° C.	25° C.	28° C.	31° C.	34° C.	37° C.
790 mm.	+8.2%	+7.1%	+6.1%	+5.0%	+3.9%	+2.9%	+1.8%	+0.8%	—0.3%
780	+6.9	+5.8	+4.8	+3.6	+2.6	+1.6	+0.6	—0.5	—1.5
770	+5.6	+4.4	+3.3	+2.3	+1.3	+0.3	—0.7	—1.7	—2.8
760	+4.2	+3.1	+2.1	+1.0	0.0	—1.0	—2.0	—3.0	—4.0
750	+2.9	+1.8	+0.8	—0.3	—1.3	—2.3	—3.3	—4.3	—5.2
740	+1.5	+0.4	—0.6	—1.6	—2.6	—3.6	—4.5	—5.5	—6.5
730	+0.1	—0.9	—1.9	—2.9	—3.9	—4.9	—5.8	—6.8	—7.7
720	—1.3	—2.4	—3.4	—4.4	—5.3	—6.2	—7.2	—8.1	—9.1
710	—2.7	—3.7	—4.6	—5.7	—6.6	—7.5	—8.5	—9.4	—10.3
700	—4.1	—5.0	—6.0	—7.0	—7.9	—8.8	—9.7	—10.7	—11.6
690	—5.5	—6.4	—7.3	—8.3	—9.2	—10.1	—11.0	—11.9	—12.8
680	—6.8	—7.7	—8.6	—9.6	—10.5	—11.4	—12.3	—13.2	—14.1
670	—8.1	—9.1	—10.1	—11.0	—11.8	—12.7	—13.6	—14.4	—15.3
660	—9.6	—10.5	—11.4	—12.3	—13.2	—14.1	—14.9	—15.8	—16.7
650	—10.9	—11.8	—12.7	—13.6	—14.5	—15.4	—16.2	—17.1	—17.9
640	—12.3	—13.2	—14.1	—15.0	—15.8	—16.6	—17.5	—18.3	—19.2
630	—13.6	—14.5	—15.4	—16.3	—17.1	—17.9	—18.8	—19.6	—20.4
620	—15.0	—15.9	—16.7	—17.6	—18.4	—19.2	—20.0	—20.8	—21.7
610	—16.3	—17.1	—18.0	—18.9	—19.7	—20.5	—21.3	—22.1	—22.9
600	—17.8	—18.6	—19.4	—20.3	—21.1	—21.9	—22.7	—23.5	—24.3
590	—19.1	—20.0	—20.8	—21.6	—22.4	—23.2	—24.0	—24.7	—25.5
580	—20.5	—21.3	—22.1	—22.9	—23.7	—24.5	—25.2	—26.0	—26.8
570	—21.8	—22.7	—23.4	—24.2	—25.0	—25.8	—26.5	—27.3	—28.0
560	—23.2	—24.0	—24.7	—25.6	—26.3	—27.0	—27.8	—28.5	—29.2
550	—24.6	—25.4	—26.1	—26.9	—27.6	—28.3	—29.0	—29.8	—30.8

* In interpolating, recken for each 1° C. 0.333% and for each mm. pressure 0.133%.

Practical as Well as Theoretical Mathematics in Gas Analysis.

By *I. W. Brandel.*

In the preceeding article entitled "Practical versus Theoretical Mathematics in Gas Analysis," several references are made in a critical way to an article on "Amyl Nitrite" by the writer.* A table of estimations, compiled in order to show the influence of temperature and barometric pressure upon the percentage of pure nitrite, has been referred to as being obtained by "unexplained expedients in order to dodge mathematical drudgery." In reality, the column of corrected results was obtained by the usual and only correct method, that is, by reducing the volume of gas to standard conditions, 0° temperature and 760 mm. pressure, by the application of the gas laws; reducing this volume to weight by multiplying by the specific gravity of the gas under standard conditions, and finally changing the weight of NO gas to its equivalent of amyl nitrite. It was taken for granted, that the average reader, who might be interested in the revision of the assay process for nitrites, was familiar with this common method of procedure.

In order to avoid the process of reasoning involved in the above way of calculating the percentage of nitrite in amyl nitrite, the formula $\frac{P \times V \times 0.0131}{19\,M(10+0.003665\,t)}$, was recommended for actual practice.

Although the percentage of amyl nitrite can be determined by mere arithmetrical calculation by means of this formula, it contains all the corrections necessary for a correct scientific calculation, and is by no means an approximate formula, as can be seen from the following way in which it was derived.

By the use of the well known formula $\frac{P \times V}{760\,(1 + .003665\,t)}$ the volume of the gas is reduced to standard conditions, viz: 0° temperature and 760 mm. pressure. Multiplying this volume of gas by the weight of 1 c. c. of gas under standard condition, viz: 0.0013436, we get $\frac{P \times V \times 0.0013436}{760\,(1 + 0.003665\,t)}$, which is the weight of NO gas generated.

---

* Pharm. Rev., 22, p. 269.

In accordance with the molecular weights of NO gas and amyl nitrite, 20 grams of gas are the equivalent of 117 grams of amyl nitrite. Therefore $\frac{P + V \times 0.0013486 \times 117}{760\ (1 + 0.003665\ t) \times 80}$ will equal the number of grams of pure amyl nitrite corresponding to V cc. of gas obtained in the assay.

Dividing the weight of pure $NO.O.C_5H_{11}$ by the weight of nitrite, M, used in the assay, and multiplying by 100, will give us the percentage of ester. This is embodied in the formula:

$$\frac{P \times V \times 0.0018436 \times 117 \times 100}{760\ (1 + 0.003665\ +) \times 30 \times M}$$

By simplification, i. e., by carrying out the multiplications and divisions indicated in the above formula, we get

$$\frac{P \times V. \times 0.1572}{228\,M\ (1 +\ 003665\,t)}$$

If we now divide by 12, the largest common divisor, we get

$$\frac{P \times V \times 0.0181}{19\,M\ (1 + 0.003665\ t)}$$

◆

Reactions of Cinchona Alkaloids.

(Supplemental to paper of *A. B. Lyons* in October of the Pharmaceutical Review.)

Resumé of Results.

Minimum percentage strength*** of solutions showing a distinct reaction.

Reagent.	Quinine acid sulphate.	Quinidine acid sulphate.	Cinchonidine acid sulphate.	Cinchonine acid sulphate.
Ammonium acetate....	0.50%	—	0.80%	—
Ammonium citrate.....	0.17%	—	0.40%	—
Rochelle salt..............	0.17%	—	0.12%	—
Ammonium oxâlate....	0.05%	—	—	—
Sodium salicylate.......	0.12%	0.15%	0.19%	0.20%
Sodium borate...........	1.00%	—	—	—
Sodium benzoate........	0.20	0.22%	0.12%	0.50%
Sodium phosphate......	0.22	0.60%	0.35%	1.00%
Potassium iodide........	—	—**	—	—
Potassium chromate..	—*	—	—	—

*** Percentages in each case are of alkaloid, not of sulphate. At the strength given in the table, a reaction occurs immediately or within 20 or 30 minutes at most. Precipitation by Wagner's reagent, or by picric acid is much more complete than by any of the salts here named. Picric acid in excess, for example, throws down quinine in solutions containing only 0.005 per cent. of the alkaloid.

** In neutral solutions of sulphate 0.2+%.

* In neutral solutions of sulphate 0.15%.

◆

ERRATUM.

Insert after line 19, p. 367, the following line:

added to the citrate solution before adding the quinine, no crystals

The Oxymethylanthraquinone Drugs and their Assay.

By *A. Tschirch.*[*]

Aloes.

Aloes does not permit the use of the above method, it contains some free aloes-emodin, but the most important principle is Aloin. An effort must be made to work out an aloin determination or an equivalent.

Beginning with Leger's method for the production of pure aloin, I have after many results worked out the following method and satisfactorily tested it upon large amounts. The determinations were caried out by Mr. Hoffbauer.

The method depends upon the following principles. I have proved by investigation, that, of the constituents of aloes, the resin is wholly inactive. At least it does not possess cathartic properties. On the other hand aloin as well as aloes-emodin are purgative. A method of determination therefore must be based upon a complete separation of the resin. This was accomplished in the following manner:

Five grammes of aloes were macerated in a 50 cc. flask for 12 hours with five cubic centimeters of methyl alcohol; then heated to 50 or 60 degrees, and 30 cc. of chloroform gradually added, thoroughly shaken, and the whole allowed to rest for some time. Then the yellow chloroform solution was separated from the soft sticky resin by decantation, and filtered through a small filter into a tared Erlenmeyer flask; the chloroform distilled off and returned to the resin, the whole thoroughly shaken and poured upon the filter. This process was repeated four times which was sufficient to exhaust. The united chloroform solutions were distilled, and the residue dried at one 100° and weighed. The residue is usually light yellow, and upon crystillization from dilute alcohol, or chloroform-methyl alcohol or abundant crystals of aloin separate. The following results are averages from two determinations.

---

[*] Continued from page 425.

	Residue.
Cape aloes, mass	86.8%
" " dried	81.2%
Uganda aloes (Cape aloes new method)	80.4%
Barbadoes aloes, new method	72.4%
" " old "	62.8%
Caracao "	66.6%
Socotra "	36.6%

From this table it appears that pharmacopoeias which admitted Cape aloes have done well. It further appears that Barbadoes aloes prepared by the new method is better than that prepared by the old method. Not so with Cape aloes. Also that mass aloes have the highest percent.

Pharmacopoeias which admit Cape aloes can require 80% of dried resin, when estimated by the above method.

It is clear that this residue is not pure aloin. However, there is always considerable aloin content as the abundant separation shows when it is crystallized from chloroform and methyl alcohol.

The quantity of aloin obtained by this method permits of the almost exact determination by means of Schouteten's reaction.

As is well known aloin gives with concentrated borax solution, a yellow solution, which in a short time takes on a green fluoresence. It is not necessary, as Schouteten states, to saturate the aloin solution with the borax. From the degree of fluorescence one can with apparent exactness determine the concentration of the solution, and thus determine the amount of aloin dissolved. We used absolutely pure dried Cape aloin of constant melting point. A solution of 1—10,000 strongly fluoresced. A solution 1—100,000 yet showed a strong fluorescence; 1—200,000 showed only a weak fluorescence; 1—250,000 was colorless: When this solution was placed in a test tube, a layer 12 mm. deep, and viewed from above over black paper, it showed only a shimmering green fluoresence which disappeared when diluted to 1—500,000. This is therefore the limit of sensitiveness. A solution 1—250,000 was therefore taken as the standard.

With this standard solution I have compared the above residues. I selected first for comparison, the residue obtained from Unganda aloes (Cape aloes prepared according to the new method). It was of a light yellow color and when treated with warm water, a small quantity of brown floculent substance settled to the bottom of the flask. Therefore a small amount of the resin had been dissolved by the chloroform-methyl alcohol. The solution was poured off from the deposit, and without filtering, 400 cc. of saturated borax solution added; then water to one liter. It was then further diluted until the fluorescence equaled that of the standard aloin solution. This point was reached when the solution was diluted to 200,000 cc. As the standard contained 1—250,000, this solution must contain 0.8 grammes of aloin. The residue used which amounted to 4.02 grammes was obtained from 5 grammes of aloes, therefore 0.80 equals 16%.

From these experiments we may derive two facts. First that the percentage of aloin is somewhat higher than is given in the text books. Second that in the 80% residue obtained 60—64% of other substances are found which cannot be aloin. In our earlier investigations we have repeatedly obtained about 60% of such admixture, and 10—20% of resin. What is the character of these substances which are associated with aloin? Are they anthroglucosides? In general they belong to the group of oxymethylanthraquinone and their rerelated substances. I have already by the use of a very simple reaction proved that nigrine belongs to the anthraquinone derivatives. Namely, the formation of crysamic acid by heating with nitric acid. This formation takes place very smoothly but not quantitatively; for example, from one gramme of aloin, 0.2 grammes of chrysamic acid were obtained, also oxalic and picric acids. One can make use of the reaction to advantage in estimating the amount of anthraquinone derivatives, and to prove the nature of the substances associated with aloins, by proceeding as follows:

Put one gramme of aloes in an evaporating dish and add 20 cc. concentrated nitric acid, and heat the mixture over a water-bath. During the first part of the reaction, cover the evaporating dish with a funnel to prevent the spurting of the nitric acid. After the production of NO_2 has ceased, and the aloes is all dissolved, which requires about two hours, remove the funnel and evaporate to dryness. Then add 2 cc. more of nitric acid, and further heat for two hours adding nitric acid occasionally to replace the loss by evaporation; then evaporate to dryness. Dissolve the oxalic and picric acids in water. The chrysamic acid will remain insoluble as long as oxalic or picric acid is present. Filter through a small glass wool filter, and wash with water. The solution is at first yellow, but as

soon as the oxalic and picric acids are completely removed, the next drop will be cherry red.

To determine the amount of chrysamic acid, compare with an ammonia solution of chrysamic acid of definite strength, by diluting to the same shade. I have chosen a solution containing 0.002 grammes in one liter which represents the amount of chrysamic acid acid produced from 0.01 gramme of aloin.

This 0.002 cc. chrysamic acid was equivalent to

0.010 Aloin.
0.015 Cape aloes, soft,
0.020 Uganda aloes,
0.020 Barbadoes aloes,
0.020 Curacoa aloes,
0.030 Socotra aloes.

From which it appears that if calculated on the basis of aloin the following must be the per cent. of substances present which produce chrysamic acid:

Cape aloes soft	66%
Uganda aloes	50%
Barbadoes aloes	50%
Curacao aloes	50%
Socotra aloes	33%

Since with the aid of Schouteten's reaction we found only 16% of aloin and the resinous part of aloes produces no chrysamic acid when treated with nitric acid, the following is the composition of Uganda aloes:

16% Aloin,
34% Substances furnishing chrysamic acid.
30% Chloroform-methyl alcohol soluble substances not furnishing Chrysamic acid,
20% Resin.

Herewith it has been proven that about half of the substances accompanying aloin in the chloroform-methyl alcohol solution are at all events derivatives of anthraquinone.

Whether there is a glucoside here as I suspect, must be learned from further investigation, for there is still room for the further investigation of this much studied aloes.

The following method of determining the free oxymethylanthraquinone has been applied to aloes.

Five grammes of aloes were dissolved in 50 cc. of 30% alcohol and the solution shaken out with benzol as long as it removed any color. The united benzol solutions were shaken out with very dilute ammonia water, as long as the water was colored red. The united ammonia solutions were diluted with water to one liter and compared with the standard emodin solution, as directed in the second method under rhubarb. To obtain a pure red it may be necessary to add five or ten cc. more ammonia.

	Per cent. of free Oxymethylanthraquinone (Aloes-emodin)
Aloe lucida Cape, hard	0.8 %
Aloe lucida Cape, soft	0.2 %
Uganda-Aloes (Cape new method)	0.5 %
Barbados-Aloes	1.0 %
Barbados-Aloes (new method)	0.33%
Curacao-Aloes	0.8 %

By comparing these results with those of the other members of the group it appears that of all the drugs tested that the bark of Rhamnus frangula is by far the richest in oxymethylanthraquinone, and Cascara Sagrada should by no means be discarded from the list of cathartics. It also appears, as I previously expected, that senna fruit is stronger than the leaves.

* * *

Literature: Aweng: Beitr. z. Kenntn. d. Faulbaumrinde, Journ. pharm. Els.-Lothr. 1897, S. 183. Derselbe: Ueber d. wirks. Bestandt. d. Frangularinde, ebenda. Derselbe Beitr. z. Kenntn. d. wirks. Bestandt. d. Cort. frang., Rad. Rhei und Folia Sennae, Schw. Wschr. f. Chem. u. Pharm. 1898, Nr. 40. Derselbe: Weitere Beitr. z. Kenntn. d. wirks. Bestandteile von Cort. Frang., Cort. Sagrad. und Rad. Rhei, Apoth.-Ztg. 1899, S. 747. Derselbe: Ueber Frangulapräparate, Pharm.-Zentrh. 1899, Nr. 21. Derselbe: Die wasserlösl. wirks. Glycoside aus Frangula, Sagrada und Rhabarber, Apoth.-Ztg. 1900, Nr. 63. Derselbe: Extr. fluidum Cascar. sagrad. examarat., ebenda, Nr. 98. Derselbe: Die Isolierung d. wirks. Bestandt. von Frangula, Sagrada u. Rhabarber und die Wertbestimm. dieser Drogen, ebenda 1901, No. 29. Derselbe: Weitere Beiträge zur Kenntn. der wirk-

samen primären Glycoside der Frangularinde, ebenda 1902, No. 44. Derselbe: Ueber ein lösliches Oxyanthrachinonglycosid aus Barbados-Aloe, Ap.-Zeit. 1902, 422.

Pedersen: Studien über die Aloe, Dissertat. Bern, 1898 (dort d. ältere Literatur). Tschirch u. Pedersen: Beiträge z. Kenntnis d. Aloe, Arch. d. Ph. 1898, S. 200. Pedersen: De nyere undersog. af emondinholdige droger, Farm. Tidende 1901. Tschirch: Vers. einer Theorie d. organ. Abführmittel, Schw. Wochenschrift f. Chem. u. Pharm., 1898, No. 23. Derselbe: Die Oxymethylanthrachinone und ihre Bedeutung für einige organische Abführmittel, Ber. Pharm. Ges. 1898, S. 174 (dort d. ältere Literatur.) Derselbe: Unters. über die Abführmittel, welche Emodine enthalten, Bull. du congr. intern. pharm., Paris, 1900 (u. Schw Wochenschr. f. Chem. u. Pharm. 1900, Nr. 42). Derselbe: Weitere Unters. über die Gruppe d. Abführm., welche Oxymethylantrachinone enthalten, Münch. Naturforsch.-Vers. 1899, S. 659 (Pharm. Zeit. 1899) Nr. 77). Derselbe: Einiges über Abführmittel, Korrespondenzbl. für Schweiz. Aerzte, 1900, Nr. 2. Tschirch: La groupe des purgatifs à Emodine, Bull. sc. pharmacolog. 1900, p. 457.

Oesterle: Ueber Aloe-Emodin und Frangula-Emodin, Arch Pharm. 1899, S. 699. Derselbe: Beiträge z. Kenntn. d. Aloin, ebenda, S. 81. Derselbe: Ueber Aloe-Emodin und Frangula-Emodin, Schw. Wochenschr. 1900, Nr. 5. Derselbe: Reduktionsvers. mit Aloe-Emodin und Frangula-Emodin, ebenda, Nr. 21. Derselbe: Oxydationsversuche mit Aloe-Emodin, ebenda, No. 49. Derselbe: Zur Kenntn. d. Bestandteile abführender Drogen, ebenda, 1902, Nr. 50. Treumann: Beitr. z. Kenntn. d. Aloe, Dissert. Dorpat 1880. J. Dietrich: Das Verhalten der Aloins im Tierkörper, Dissert. Dorpat 1885. Kondracki: Beitr. z. Kenntn. d. Aloe u. Wertbestimmung ihrer wichtigeren Handelss., Dissert. Dorpat 1874. Liebelt: Barbados-Aloe, Dissert. Jena 1875. Groenewold: Beitr. z. Kenntn. d. Aloins etc. Dissert. Erlangen 1889. Balster: Ueber d. Wirkung des reinen Aloins, Dissert. Marburg 1890. Tschirch: Ueber die Aloe, Apoth.-Ztg. 1901, Nr. 78. Tschirch u. Klaveness: Ueber die Natalaloe und Ugandaaloe, Arch. Ph. 1901, S. 231 u. 241. Tschirch u. Aschan: Unters. einiger vom Kap stammender Aloesorten, Arch. Pharm. 1903, S. 340. Tschirch u. Küylenstjererna: Enthält Capaloin Methoxyl? ebenda, S. 689. Heuberger, zur Aufklärung der Aloereaktionen. Léger: Sur les aloines, Bull. soc. chim. 1899. Le même: Sur la barbaloine. Le même: Sur l'isobarbaloine, ibidem 1900. Le même: Sur la constitution des aloines, ibidem 1902. Le même: Sur quelques dérivés de l'anthraquinone obtenus à l'aide des aloines, ibidem 1902. Le même: Caractérisation des aloes et leur recherche dans les préparations pharmaceutiques, Journ. de pharm. 1902. Le même: Sur la barbaloine, ibidem 1902. Le même: Aloes and aloines, ibidem 1902. Le même: Sur la constitution des aloines, ibidem 1903. Le même: Sur les aloines de l'aloes de Natal, ibidem 1903. Hirschsohn: Ueber einige Aloereaktionen, Pharm. Zentrh. 42 (1901) 63. Seel: Ueber die Oxydation der Aloine mit Kaliumpersulfat u. mit der Caro'schen Säure, Ber. d. chem. Ges. 1901, S. 3212. Kremel: Nachweis d. Aloe in Gemischen, Pharm. Zentrh. 36, S. 656.

Laffont: Cascara Sagrada, Cascarine, Paris 1892 (dort die ältere Literatur). Prescott: Am. Journ. ph. 1879. Wenzell: Ph. Journ. Transact. 1886. Meier u. Weber: Am. Journ. pharm. 1888, p. 87. Schwabe: Ueber die chem. Bestandt. von Cort. Frangulae u. Cascara Sagrada, Diss. Leipzig, 1888 (Arch. Ph. 1888, S. 569). Kubly: Pharm. Zeitschr. Russlands 1866. Casselmann: Lieb. Ann. 104, S. 77 (1857). Faust: Arch. Pharm. 1869 u. Ann. Chem. Pharm. 1873, 165. S. 229. Keussler: Dissert. Dorpat 1879. Dohme u. Engelhard: Pharm. Journ. 1898, p. 49. K. Dieterich: Zur Wertbestimm. d. Frangularinde, Pharm. Zentrh. 1899, No. 18. Tschirch u. Polacco: Ueber die Früchte von Rhamnus cathart., Arch. Pharm. 1900, S. 459 und Polacco: Dissert. Bern, 1900 (dort die Literatur).

Tschirch und Heuberger: Unters. über die chines. Rhabarber, Arch. Pharm. 1902, S. 596, und Heuberger: Dissert. Bern 1902 (dort die ältere Literatur). Tschirch: Notizen über den Rhabarber und seine wirks. Bestandt., Arch. Pharm. 1890, S. 632. Hesse: Ueber Rhabarberstoffe, Lieb. Ann. 309, S. 32. Derselbe: Chemistry of Rhubarb, Pharm. Journ. 1895 Oct. Hunkel: Contribution to the chemistry of Rhubarb, Pharmaceutical. Arch. 3, Nr. 11, 1901. Gilson: Les principes actifs de la rhubarb. Rev. pharm. 1898. Le même: Les tannoides de la rhubarbe de Chine. Acad. roy. de Médec. Belgique 1902. Eijken: Unters. von in Bern kultivierten Rhabarbarberrhizomen, Diss. Bern 1904.

Keussler: Unters. d. chrysophanart. Subst. d. Sennesbl., Dissert. Dorpat 1879. Kubly: Ueber d. wirks. Princip d. Sennesblätter, Dissert. Dorpat 1865. Gensz: Die Catharthinsäure der Senna, Dis-

sert. Dorpat 1893. Tschirch u. Hiepe: Beitr. z. Kentniss d. Senna, Arch. d. Pharm. 1900, S. 427, and Hiepe: Dissert. Bern 1900 (dort die ältere Literatur).

Binswanger: Pharmakol Studien über Rhamnus frangula u. Rh. cathartica, München 1850. Esslemont: Beiträge zur pharmakolog. Wirkung von Abführmitteln der Aloederivatgruppe, Arch. exper. Pharm. 43, S. 274. Ewald: Das Purgatol, ein neues Abführmittel, Therapie d. Gegw. 1901, Mai. H. Vieth: Ueber ein synthetisch gewonnenes Abführmittel (Purgatin). Münch. mediz. Wochenschr. 1901, Nr. 35. Vámossy: Ueber ein neues Abführmittel, Therapie d. Gegw. 1902, S. 202. Magnus: Pharmakol. der Magen- u. Darmbewegungen in Asher u. Spiros Ergebnissen der Physiologie, II. Jahrg, 2. Abth. 1903. Abführmittel S. 661. W. Ebstein: Exodin, ein neues Abführmittel, Deutsch. mediz. Wochenschr. 30 (1904) S. 12. Derselbe: Die chronische Stuhlverstopfung in der Theorie und Praxis, Enke 1901. Brissemoret: Contribut. à l'étude des purgatifs organiques, Paris, Joanin & Co., 1903. Le même: Le groupement fonctionnel eccoproticophore de quelques purgatifs organiques. Bull. sc. pharmacol, 1903, p. 17. Nasse: Beitr. z. Physiol. d. Darmbewegung, Leipz., Engelm., 1866. Hans Meyer: Ueber Aloe, Schmiedebergs Arch. 28 (1891) 186. Stadelmann: Exper. Unters. über die Wirkung von Abführmitteln bei Gallenabwesenheit im Darm. Schmiedebergs Arch. 37 (1896) 352 und Deutsche Aerztezeit. 1901 Mai (Purgatin). v. Hösslein: Ueber ein neues Abführmittel, Purgatin, Münch. mediz. Wochenschr. 1902, Nr. 32. Kachel: Ueber die Anwendung des Purgatins bei Wöchnerinnen, Therap. Monatshefte 1903. Aug. Brandl u. Tappeiner: Vers. über Peristaltik nach Abführmitteln, Schmiedebergs Arch. 26 (1889) 177. Thiry u. Brieger: Ueber eine neue Methode, den Dünndarm zu isolieren, Wien, Akad. Ber. 1864. 51, I, S. 77. Brieger: Zur physiolog. Wirkung der Abführmittel, Schmiedebergs. Arch. 8 (1878) 355. Flemming: Exp. Beitr. z. Kenntn. d. Abführmittel, Dissert., Peterburg 1893. Pio Marfori: Ann. di farmac, Milano 1900, p. 85. Pirault: La Bourdaine au point de vue pharmacologique et thérapeutique. Thèse Paris 1903. Fränkel: Arzneimittelsynthese, Berlin 1901.

Ferner aus früherer Zeit verschiedene Mitteilungen Bucheims und Dorpater Dissertationen seiner Schüler (v. Cube u. a.).

American Pharmaceutical Colleges and Schools.

By *Wilbur Scoville.**

DEGREES AND REQUIREMENTS.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
	ALABAMA.									
1.	Ala. Polytechnic Inst.	Auburn	2 yrs.	5 yrs.	......	......	4 yrs.	5 yrs.	......	2 yrs. for Ph. C.
2.	Med. Coll. of Alabama, Dept. of Pharm. (Dept. of Univ. of Alabama)	Mobile	2 yrs.	......	......	......	......	......	......	None.
	CALIFORNIA.									
3.	Cal. Coll. of Pharm. (Dept. of Univ. of Cal.)	S. Francisco	2 yrs.	......	......	3 yrs.	......	......	......	4—Ph. G. & 3 yrs. Ph. B.
4.	Coll. of Phys. and Surg. of S. Francisco. (Dept. of Pharmacy.)	S. Francisco	2 yrs.	......	3 yrs.	......	......	......	......	4 yrs. or M. D.
	DIST. OF COLUMBIA.									
5.	Nat. Coll. of Pharm.	Washington	......	......	3 yrs.	......	......	......	......	4 yrs.
6.	Howard University, Medical Dept., Pharm. Coll.	Washington	2 yrs.	......	2 yrs.	......	......	......	......	4 yrs.
	GEORGIA.									
7.	Atlanta Coll. of Pharm. (Dept. of Coll. of Phys. and Surg)	Atlanta	2 yrs.	3 yrs.	......	......	......	......	......	None.
8.	Mercer Univ. School of Pharmacy	Macon	2 yrs.	2 yrs.	......	......	......	......	......	None.
9.	Southern College of Pharmacy	Atlanta	......	......	......	......	......	......	......	......
10.	University of Georgia, College of Pharmacy	Athens	2 yrs.	......	......	......	......	......	......	None.

---

* Continued from page 407.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
	ILLINOIS.									
11.	Austin Coll. of Pharm.	Effingham	......	......	......	......	......	......	......	......
12.	Chicago Coll. of Pharm. (Dept. of Univ. of Ill.)	Chicago	2 yrs.	Indefin.	......	......	......	......	......	4 yrs.
13.	Ill. Med. Coll., Dept. of Pharm	Chicago	1 yr.	1 yr.	......	......	......	......	1 yr.	4 yrs. Ph.G.–9 yrs. Ph.M.
14.	Northw. Univ. School of Pharm	Chicago	56 wks.	76 wks.	......	......	......	......	4 yrs.	None.
	INDIANA.									
15.	Northern Ind. School of Pharm. (Dept. of Valparaiso Coll.?)	Valparaiso	1 yr.	2 yrs.	......	......	......	......	......	None.
16.	Notre Dame Univ., Dept. of Pharm	Notre Dame	2 yrs.	3 yrs.	......	......	......	......	......	None.
17.	Purdue Univ. School of Pharm	La Fayette	64 wks.	......	......	......	4 yrs.	......	......	None.
18.	Tristate Normal School Dept. of Pharm	Angola	......	......	......	......	......	......	......	......
	IOWA.									
19.	Highland Park Coll. of Pharm. (Dept. of Highland Park Coll.)	Des Moines	48 wks.	72 wks.	Indef.	......	3 yrs.	......	3 yrs.	None.
20.	Iowa College of Pharm. (Dept. Drake Univ.)	Des Moines	2 yrs.	......	......	......	......	......	......	None.
21.	State Univ. of Iowa, Dept. of Pharm	Iowa City	2 yrs.	......	......	......	......	......	......	None.
22.	Keokuk Coll. of Pharm. (Dept. of Keokuk Med. Coll.)	Keokuk	2 yrs.	......	......	......	......	......	......	None.
	KANSAS.									
23.	Univ. of Kansas, School of Pharm	Lawrence	2 yrs.	3 yrs.	......	......	4 yrs.	......	......	None.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
	KENTUCKY.									
24.	Louisville College of Pharm.	Louisville	......	......	2 yrs.	......	......	......	2 yrs.	4 and 9 yrs.
	LOUISIANA.									
25.	Med. Dept. of Tulane Univ., Course in Pharm.	New Orleans	2 yrs.	......	......	......	......	......	......	2 yrs.
26.	New Orleans Coll. of Pharm.	New Orleans	2 yrs.	......	......	......	......	......	......	4 yrs.
	MAINE.									
27.	Univ. of Maine Coll. of Pharm.	Orono	2 yrs.	......	......	......	4 yrs.	5 yrs.	......	None.
	MARYLAND.									
28.	Maryland College of Pharm.	Baltimore	2 yrs.	......	2 yrs.	......	......	......	......	None.
	MASSACHUSETTS.									
29.	Mass. Coll. of Pharm.	Boston	......	2 yrs.	2 yrs.	......	......	......	......	4 yrs. for Phar. D.
	MICHIGAN.									
30.	Detroit Coll. of Med., Dept. of Pharm.	Detroit	2 yrs.	......	......	......	......	......	......	None.
31.	Ferris Inst., Dept. of Pharm.	Big Rapids	(1 and 2 year courses without degrees)						......	3 yrs.
32.	Univ. of Mich. School of Pharm.	Ann Arbor	......	2 yrs.	......	......	4 yrs.	5 yrs.	......	None.
	MINNESOTA.									
33.	Univ. of Minn. Coll. of Pharm.	Minneapolis	......	2 yrs.	4 yrs.	......	......	......	3 yrs.	None.
34.	Minn. Inst. of Pharm.	Minneapolis	(No degrees)							
	MISSOURI.									
35.	Kansas City Coll. of Pharm. and Natural Sciences	Kansas City	2 yrs.	......	......	2 yrs.	......	......	......	3 yrs. for Ph. G.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph M.	Store experience.
36.	St. Louis College of Pharm.	St. Louis	2 yrs.	3 yrs.	......	2 yrs.	......	......	......	4 yrs. for Ph. G.
36a.	Bates Coll. of Pharm.	St. Louis	2 yrs.	......	......	2 yrs.	......	......	.....	– yrs. for Ph. G.
	NEBRASKA.									
37.	Omaha Coll. of Pharm.	Omaha	50 wks.	......	......	......	......	......	......	3 yrs.
	NEW JERSEY.									
38.	New Jersey College of Pharm.	Newark	2 yrs.	......	......	......	......	......	......	4 yrs.
	NEW YORK.									
39.	Albany Coll. of Pharm. (Dept. Union Univ.)	Albany	2 yrs.	......	......	......	......	......	......	4 yrs.
40.	Brooklyn College of Pharm.	Brooklyn	2 yrs.	......	3 yrs.	......	......	......	......	4 yrs. for Ph. G.
41.	Buffalo Coll. of Pharm. (Dept. Univ. Buffalo)	Buffalo	2 yrs.	......	3 yrs.	......	......	......	2 yrs.	2 yrs. for Ph. M. & Ph. B.
42.	Coll. of Pharm. of the City of New York, Dept. of Univ. of State of New York	New York	2 yrs.	......	3 yrs.	......	......	......	......	4 yrs.
43.	Board of Pharm. Inst. of City of N. Y.	New York	3 mos.	......	......	......	......	......	......	None.
	NORTH CAROLINA.									
44.	Univ. of N. Carolina, Dept. of Pharm.	Chapel Hill	2 yrs.	......	......	......	......	......	......	4 yrs.
45.	Leonard Schools of Med. and Pharm. (Dept. of Shaw Univ.)	Raleigh	3 yrs.	......	......	......	......	......	......	None.
	NORTH DAKOTA.									
46.	N. Dak. Agr. Coll., Dept. of Pharm.	Fargo	2 yrs.	4 yrs.	......	......	4 yrs.	......	......	2 yrs. for Ph. G. & Ph. C.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
	OHIO.									
47.	Cincinnati Coll. of Phar.	Cincinnati	......	......	......	......	......	......	......	......
48.	Clevel. School of Pharm.	Cleveland	......	2 yrs.	......	......	......	......	......	None.
49.	Ohio Med. Univ., Coll. of Pharm.	Columbus	2 yrs.	......	......	......	......	......	......	None.
50.	Ohio Normal Univ., Dept. of Pharm.	Ada	1 yr.	2 yrs.	......	......	......	......	......	None.
51.	Ohio State Univ., Coll. of Pharm.	Columbus	......	2 yrs.	......	......	4 yrs.	......	......	None.
53.	Scio College, Dept. of Pharm.	Scio	1 yr.	2 yrs.	......	......	......	......	......	None.
	OKLAHOMA.									
54.	Univ. of Oklahoma, School of Pharm.	Norman	......	2 yrs.	......	......	......	......	......	2 yrs.
	OREGON.									
55.	Oregon Agr. Coll., Dept. of Pharm.	Corvallis	......	......	......	......	4 yrs.	5 yrs.	......	None.
56.	Oregon Coll. of Pharm.	Portland	......	......	......	......	......	......	......	......
	PENNSYLVANIA.									
57.	Med.-Chirurgical Coll. of Philadelphia	Philadelphia	2 yrs.	......	3 yrs.	......	......	......	......	4 yrs. each.
58.	Philadelphia College of Pharm.	Philadelphia	......	3 yrs.	3 yrs.	......	......	......	......	4 yrs. for Phar. D.
59.	Pittsburg College of Pharm. (Dept. of W. Univ. of Pennsylvania.	Pittsburg	2 yrs.	3 yrs.	3 yrs.	......	......	......	3 or 4 yrs.	4—Ph. G.—9 y.—Ph. M.
60.	Temple Coll., Dept. of Pharm.	Philadelphia	......	......	2 yrs.	......	......	......	......	4 yrs.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
	RHODE ISLAND.									
61.	Rhode Island Coll. of Pharmacy and Allied Sciences	Providence	2 yrs.	2 yrs.	......	......	......	......	......	3 yrs. for Ph. G.
	SOUTH CAROLINA.									
62.	Med. Coll. of State of S. Carolina, Dept. of Pharm.	Charleston	2 yrs.	......	3 yrs.	......	......	......	......	2 yrs. each.
	SOUTH DAKOTA.									
63.	S. Dakota Agr. Coll., Dept. of Pharm.	Brookings	2 yrs.	......	......	......	4 yrs.	......	......	None.
64.	Dakota Normal Coll., Dept. of Pharm.	Sioux Falls	......	......	......	......	......	......	......	......
	TENNESSEE.									
65.	Chatanooga Med. Coll., Dept. of Pharm.	Chatanooga	......	......	......	......	......	......	......	......
66.	Sewanee Medical Coll., Coll. of Pharm.	Sewanee	2 yrs.	......	......	......	......	......	......	None.
67.	Meharry Pharm. Coll. Dept. of Walden Univ.	Nashville	......	3 yrs.	......	......	......	......	......	None.
68.	Univ. of Tennessee, School of Pharm.	Knoxville	......	2 yrs.	......	......	4 yrs.	......	......	None.
69.	Vanderbilt Univ., Dept. of Pharm.	Nashville	......	2 yrs.	......	......	......	......	3 yrs.	None.
	TEXAS.									
70.	Bayler Univ., Dept. of Pharm.	Dallas	2 yrs.	......	2 yrs.	......	......	......	......	2 yrs. for Ph. G.
71.	Univ. of Texas, School of Pharm.	Galveston	2 yrs.	......	......	......	......	......	......	None.
	VIRGINIA.									
72.	Virginia School of Pharm. of Med. Coll. of Virginia	Richmond	2 yrs.	......	......	......	......	......	......	None.

No.	Official title of institution.	Location.	Ph. G.	Ph. C.	Phar. D.	Phar. B.	B. Sc.	M. Sc.	Ph. M.	Store experience.
73.	Univ. Coll. of Medicine, Dept. of Pharm.	Richmond	2 yrs.	......	......	2 yrs.	......	......	......	3½ yrs. for Ph. G.
	WASHINGTON.									
74.	Washington Agr. Coll., School of Pharm.	Pullman	2 yrs.	......	......	......	......	......	......	None.
75.	Univ. of Washington School of Pharm.	Seattle	2 yrs.	4 yrs.	......	......	......	......	......	2 yrs. for Ph. G.
	WEST VIRGINIA.									
76.	West Virginia Univ., Dept. of Pharm.	Morgant'wn	......	......	......	......	4 yrs.	......	......	None.
	WISCONSIN.									
77.	Mil. Med. Coll., Dept. of Pharm.	Milwaukee	2 yrs.	......	......	......	......	......	3 yrs.	None.
78.	Univ. of Wisconsin School of Pharm.	Madison	2 or 3 yrs.	......	......	......	4 yrs.	......	3 or 4 yrs.	None.
	CANADA.									
79.	Manitoba College of Pharm.	Winnipeg	1 yr.	......	......	......	......	......	......	None.
80.	Montreal College of Pharm.	Montreal	2 yrs.	......	......	......	......	......	......	None.
81.	Ontario Coll. of Pharm., Dept. of University of Toronto	Toronto	......	......	......	2 yrs.	......	......	......	4 yrs.
	PHILIPPINES.									
82.	Pharm. Faculty Univ. Santo Tomas	Manila	......	......	......	......	......	......	......	......
	PUERTO RICO.									
	School of Pharmacy contemplated.									

The Study of Phytochemistry.*

By *Edward Kremers.*

However, chemists did not totally ignore the study of plants and plant products during these periods, although the prevailing theories drew their support principally from the study of the metals and their salts. Thus e. g. among the earliest chemical products known we find such as we now relegate to the domain of organic chemistry. The only acid known to the ancients was an organic acid, viz. acetic acid. An organic plant substance, a preparation of nutgalls containing tannin, was the first reagent employed. Another organic plant product, turpentine oil, appears to have been the first substance obtained by the process of distillation, a process possibly of greater importance than any other in the entire history of chemistry. The first salts were prepared with an organic acid, and the process of saponification was practiced at an early date. Fermentation of wine and vinegar were known. Fats, oils, resins, gums, starch, sugar, vinegar, pigments were obtained from vegetable sources.

While during the alchemistic period, the process of distillation was practiced principally with the aim of producing the philosopher's stone, it also lead to the preparation of aromatic waters and the discovery of a few volatile oils. The destructive distillation of tartar was also attempted thus not only leading to the discovery of potassium carbonate but also preparing the way for a principal phytochemical method of technique of the next period. Benzoic acid from gum benzoes, succinic acid from amber, wood vinegar from wood, are some of the contributions to our knowledge of plant chemistry by the method of destructive distillation.

Although iatrochemical theories were at least in part based in observations made in connection with animals and plants, the former as represented by the human body demanded the special attention of the medico-chemists. While it is true that pharmaceutical chemistry made commendable progress during the iatrochemical period, it should not be forgotten that the medico-chemists of this period advocated inorganic remedies in opposition to the older galenical preparations. Thus the chemical study of vegetable drugs and galenical preparations, which later contributed so much to the development of plant chemistry, received a setback by this attidude of the followers of Paracelsus.

---

* Continued from page 396.

II. — The period during which the chemical subject matter was classified according to the three natural kingdoms into mineral, vegetable and animal. For the sake of convenience rather than of absolute accuracy we may date this period from about 1675, the date of appearance of Lemery's Cours de Chimie to about 1780, the time when Bergmann suggested the more rational classification into inorganic and organic. This period is approximately contemporaneous with the phlogistic period of chemical history at large.

That the iatrochemical theories drew attention to the mineral and animal kingdoms, and retarded the chemical study of plants, has already been pointed out. Neither could the phlogistic theory of combustion and calcination contribute much to the study of plants. The burning of plants or plant products may reveal their inorganic components, at least in part, but this process destroys absolutely their more complex organic constituents.

We are not surprised, therefore, that this second period of plant chemistry has but little genuine progress to record. We are prepared to learn, that the method which lead to the discovery of benzoic and succinic acids when indiscriminately applied as it was during this period, yielded scarcely any satisfactory results. The pyrochemical investigations of 1400 plants and plant products have been burried in the Memoires of the French Academy. May they forever rest in peace.

III. — The third period begins contemporaneously with the antiphlogistic or quantitative period of general chemical history. It is modern chemistry that we now have to deal with. Organic and with it phytochemistry lean strongly on inorganic chemistry, in connection with which the study of oxygen, its acids and bases, and their salts are studied. The development of organic analysis is essential to an empirical understanding of the chemical individuals isolated from plants and plant products. These new substances are viewed in the light of prevailing inorganic theories as far as this is possible. The acids, tartaric and succinic, attract special attention. Their salts of the metals are known, but not until the discovery of the basic properties of morphine, this "new salifyable plant base" by Sertüner in 1817 are any organic bases known to chemists. While theoretical chemists heralded this discovery as the proof that organic compounds could be classified, like their inorganic prototypes, into acids, bases and salts, the pharmaceutical chemist, recognizing the thereapeutic relation between morphine and opium, at once began a search for other physiologically active substances of a basic nature in well known toxic drugs. How successful this search has been, becomes apparent from a mere glance at a list of alkaloids arranged according to the date of their discovery. While such analogies as those between the organic plant acids and inorganic acids, between the alkaloids and metallic bases were utilized theoretically for all they were worth by the chemical philosopher, plant chemistry had to deal with numerous other substances that revealed no such analogies. Many of these substances were not chemical individuals but mixtures. Among the chemical individuals isolated from plants we have cane sugar, camphor, later menthol and others. Among the mixtures we find fatty and volatile oils, gums, resins etc. the chemical complexity of which, in most instances, is not even surmised. The classification of the volatile oils e. g. into hydrocarbon oils, oxygenated oils and oils containing nitrogen and sulphur in addition to carbon, hydrogen and oxygen is characteristic of this conception. When we find that a volatile oil, of which we now know ten to twenty different constituents is subjected to elementary analysis as such as late as the thirties, we cannot but feel that the great importance of studying chemical individuals rather than plant mixtures is not as fully appreciated as it might be.

Nevertheless the characteristic of this period as compared with former periods in the study of chemical individuals isolated from plants or plant products. As opposed to the "ultimate" principles: water, carbon, acetic acid, wood spirit yielded more or less by all plant products when subjected to the analysis by fire (destructive distillation) these new substances were termed "proximate" principles, that is those principles of plants "which enter immediately into their composition, when these principles have not been altered by further decompositions, and consequently when they still present their .... vegetable character." *

IV. Period. — It has already been stated that the claim is made

---

* Macquer, Dict. of Chemistry, Engl. ed. 1771, p. 363.

for Liebig of being the founder of scientific or modern organic chemistry. This branch was made independent of inorganic chemistry and followed its own ways and in the course of time became the stronger sister to which inorganic chemistry looked for new ideas and new inspirations. In 1843 Liebig reedited the chemical part of the 5th edition of Geiger's "Handbuch der Pharmacie" as the "Handbuch der Chemie." The second part, devoted to organic chemistry, placed organic chemical book literature on a new basis. It served as a guide to chemists the world over. In as much as Liebig and his students had devoted much of their time to the study of substances derived from plants, it does not surprise us to find the large amount of space devoted to what we are pleased to designate plant chemistry.

The newer theory of radicles which had its birth in the classical researches of Liebig and Wöhler of the bitter almond oil, obtained by the hydrolysis of amygdalin, two plant products, is the prevailing theory. Plant products of known constitution were classified with others of their kind in the general system of classification of carbon compounds. However, the lumber chamber of compounds, whose relationship has not been ascertained, is still great and the older classification still prevails to a large extent not only at the beginning of this period, but even to-day.

The theory of types which did such admirable service during the middle of the last century has not released its grip on plant chemistry, even though for purposes of classification it has been superceeded by more rational principles of classification. Not only were aniline and like bases viewed successfully as substituted ammonias by Hofmann in the early forties, but the alkaloids as well, and to-day text books still define them as such.

The structural theories of Kekulé as manifested in the later conceptions of the pyridine molecule in which a methenyl group of benzene has been displaced by an imido group were reechoed in the chemistry of the alkaloids and to-day we find one of the latest treatises arranged on König's definition that an alkaloid is a pyridine derivative, although the author admits that recent structural investigations in this field have revealed that but few of these bases can be referred back even to reduced pyridine and quinoline nuclei. Thus we find one organic theory after another reechoed in the study of organic plant substances.

Whereas during the previous period organic facts were interpreted in the light of inorganic theories, inorganic chemistry now began to interpret its facts in the light of organic theories. In like manner, phytochemistry, always a modest contributor to the science of chemistry, while continuing to receive aid from organic chemistry, became an important contributor as well.

Thus e. g. the study of the property of the deviation of polarized light has been developed largely with the aid of plant products and their derivatives. As a matter of fact this branch of physical chemistry is to-day largely dependent upon the materials obtained from the plant world for its study. With these observations there has been developed the hypothesis of optical isomerism, one of the most interesting and fruitful chapters in the study of isomerism, the physiological importance of which is just beginning to dawn upon us.

In this connection the vitalistic theories should be remembered. With the synthesis of urea by Wöhler in 1828 the first serious blow was struck at the old vitalistic theory. The hold which this theory, had upon man's imagination can best be comprehended if we stop to consider that it has sprung up anew. The new vitalistic theory of to-day is largely dependent upon the study of the optical isomerism of plant products for its support.

The very termes aliphatic and aromatic of organic classification at once suggest properties of plant products. The chasm that long existed between the fatty series of compounds on the one hand and the benzene series on the other has largely been filled in by the study of the socalled terpenes and camphors, again by plant products.

Other instances might be mentioned showing the indebtedness of organic chemistry and of chemical theories at large to plant chemistry. The few mentioned, however, may suffice. Yet with all this progress, phytochemistry still has an enormous lumber chamber the dabbling in which is apt to cast a ray of scientific inferiority upon the science of phytochemistry as a whole. While on the one hand substance after substance is being removed to receive its position in the well regulated drawing room of structural chemistry, if you will pardon this figure of speech for the sake of avoiding mixed methaphors, large numbers of new plant substances of unknown constitution are at least temporarely and mostly for long periods of time added to this lumber-chamber each year.

(*To be continued.*)

Literary.

Books Reviewed.

GESCHICHTE DER PHARMACIE, von Hermann Schelenz. Ein Band, 934 Seiten. Verlag von Julius Springer in Berlin. 1904. $6.50.

Wenigen in aufreibender Berufspraxis stehenden Pharmaceuten ist es bei vorhandener Anlage und Neigung für historisches Studium vergönnt, die Pfade der Geschichtsforschung auf den naheliegenden Berufsgebieten der Arzneikunde und der traditionellen Apothekerkunst productiv zu betreten. Den Meisten ist dadurch ein Einblick in das nahezu unerschöpfliche historische Wissensmaterial nicht vergönnt, welches sich in den grösseren Büchersammlungen der alten Welt aus allen Zeitaltern und Stadien menschlichen Forschens, Wissens und Irrens in übergrosser Masse und Fülle im Laufe der Jahrhunderte bis auf unsere Zeit erhalten und angesammelt hat. Wer sich aber bei dem Austritt aus vieljähriger Berufs- und Geschäftsthätigkeit auch für die älteren Lebensjahre die alte Neigung für geschichtliche Sammlung und Forschung erhalten und die erforderliche literarische Gewandtheit gewonnen, und schliesslich nachhaltige Anregung durch den leichten Zutritt zu grossen Bibliotheken gefunden hat, dem liegt auf unseren Berufsgebieten ein weites und einladendes Feld für wünschenswerthe Bearbeitung vor.

Wohl ist die deutsche Fachlitteratur nicht arm an Specialwerken und Monographien einzeler Zweige der Arzneimittelkunde und der Apothekerkunst, sowie auch an geschichtlichen Skizzen und Fragmenten aus älterer und neuerer Zeit. An der Wende des Jahrhunderts, an der besonders die Pharmacie auf manchen Wandel zurückblickt und für conservativen Fortbestand von schwer zu lösenden Problemen confrontirt wird, traten der Wunsch und die Hoffnung mehr und mehr hervor, dass aus Berufskreisen eine geeignete Kraft für die Herstellung einer einheitlichen allgemeinen Geschichte der Pharmacie oder eines Grundrisses derselben endlich erstehen möge. Das Feld war längst reif für den Schnitter, nur fehlten noch die rechten berufenen Hände, um die Körner von der Spreu zu sondern und die Ernte einzubringen.

Eine um so angenehmere Ueberraschnng war daher das zur Zeit in den Buchhandel gelangte Werk "Geschichte der Pharmacie" von Schelenz. Dasselbe bekundet die vieljährige mühevolle und fleissige Arbeit eines in der Stille schaffenden, vom praktischen Beruf zurückgetretenen deutschen Pharmaceuten, dem offenbar historischer Sinn, rüstige Arbeitslust und Kraft unvermindert erhalten sind, und dem vor allem die Benutzung grosser Bibliotheken sich dargeboten hat. Diesem glücklichen Zusammentreffen verdanken nun unsere Zeit und unser Beruf die Schaffung des vorliegenden monumentalen Werkes, einer wirklichen Geschichte der Pharmacie.

Mag das Werk, wie der Verfasser in der Vorrede vorbeugend erwähnt, in der Fülle und Masse des heterogenen Geschichtsmaterials, in dessen Zusammenstellung und zeitlichen Gruppirung hin und wieder etwas zusammenhanglos scheinen und mögen manche Angaben über die pharmaceutischen Zustände und Personen des Auslandes nicht ganz Zutreffende sein, so ist dasselbe im allgemeinen doch ein wohl angelegter und gelungener Abriss der Geschichte der Pharmacie, welcher in Berufskreisen und der Fachliteratur überall freudige und dankbare Aufnahme finden wird.

Eine eingehende sachliche Besprechung eines so umfassenden Werkes liegt bei der Masse und Fülle des Gesammtinhaltes ausserhalb des Rahmens der speziellen Fachpresse. Möge es genügen bei der rückhaltlosen Anerkennung der Bedeutung und des Werthes desselben für die Herstellung späterer Neuauflagen nur auf einige, wesentlich amerikanische Verhältnisse betreffende, unzulängliche oder unrichtige Angaben in möglichster Kürze hinzuweisen.

Seite 410. Die richtigere Deutung des Pseudonym "Eunonymus Phi atrus" dürfte die auf Seite 56 der "Aetherischen Oele" von E. Gildemeister und Fr. Hoffmann angegeben sein.

S. 542. Die erste nationale gelehrte Gesellschaft "The American Philosophical Society" wurde von Benjamin Franklin in Philadelphia im Jahre 1743 gegründet. (A retrospect of American Pharmacy. Proceed. Am. Pharm. Assoc. Vol. 50 (1902) p. 110.

S. 599. Die historischen Angaben über Cajeputöl lassen sich durch die in den 'Aetherischen Oelen" von E. Gildemeister und Fr. Hoffmann Seite 680—681 darüber gemachten berichtigen.

S. 628, 654 und 724. Eingehende und zutreffende Angaben über die Entstehung der ersten amerikanischen Fachshulen und Fachjournale befinden sich in "A retrospect of American Pharmacy" (Proceed. Am. Pharmac. Assoc. Vol. 50 (1902) p. 112, und "A Century of Amer. Pharmac. Literature and Journalism" by Fr. Hoffmann in "American Druggist," Vol. 36 (1900) pp. 160—161).

S. 643. Die Benutzung von Kalendern (Almanachs) als ausgiebige Reclame für Geheimmittel hat seit etwa der Mitte des vorigen Jahrhunderts in grossartiger Weise in America stattgefunden. Ein Versuch, diesem äusserst erfolgreichen Modus mit gleicher Waffe (Gesundheits-Almanach, 1876 bis 1877) entgegenzutreten, erwies sich als ungenügend. (Chicago "Pharmacist", Vol. 7 (1874) p. 321 und 374 und "Proceed. Americ. Public Health Assoc. 1874 — "Proceed. Am. Pharmac. Assoc. Vol. 23 (1875) p. 819).

S. 724. Die "Proceed. Amer. Pharmac. Assoc." sind kein journal, sondern die Berichte über die Verhandlungen der Jahresversammlungen des Vereins und über die Fortschritte der Pharmacie.

S. 727. Die vielmals stattfindende Verwechselung der U. St. Pharmacopœia und der U. St. Dispensatory erklärt sich aus deren nur 12 Jahre auseinander liegenden erstem Erscheinen, und noch mehr aus der Thatsache, dass das letztere umfassende Werk als ein allseitiger Commentator der Pharmacopœ diese im praktischen Brauche bald erheblich verdrängte. Die erste Ausgabe der Pharmacopœ erfolgte nach einigen früheren Versuchen im Jahre 1820 mit der bisher fortbehaltenen Bestimmung einer zehnjährigen Neuausgabe. Die erste Ausgabe des Unit. Stat. Dispensatory von Franklin Bache und George B. Wood geschah im Jahre 1833. Seitdem sind 17 weitere Auflagen erschienen.

S. 765. Die bis zum Jahre 1845 zurück datirende Fabrikation amerikanischer Kautschukpflaster ist auf S. 254—257 des 5. Bandes (1887) der "N. Y. Pharmac. Rundschau" beschrieben. Schon die zuerst gangbaren Pflaster waren perforirte. (Alcock's Porous Plaster.)

S. 805. Zur Note 10 sollte noch beigefügt werden: Pharmac. Centralhalle, 1884, No. 26 und 27.

Wer für die Geschichte seines Berufes Sinn und Interesse hat, dem wird das auch schön ausgestattete Werk des Herrn Schelenz eine reiche Quelle der Belehrung, der Anregung und auch der Aussöhnung mit so manchen wirklichen oder vermeintlichen Absonderlichkeiten und Härten des Apothekerberufes werden. Dasselbe gereicht dem Verfasser zur Ehre und zum bleibenden Andenken und gewährt eine schätzenswerthe Bereicherung für Privat- und Fachschulbibliotheken.

Ebenso sollte dasselbe der zu Anfang dieses Jahres in der "Pharmaceutical Review" (1904) p. 7, und im Amer. Journ. Pharmacy (1904) p. 83 veröffentlichten Liste der bedeutendsten Geschichtswerke der Pharmacie beigeschrieben werden.

Fr. Hoffmann.

LABORATORY EXERCISES IN PHYSICAL CHEMISTRY by F. H. Getman. First edition, first thousand, pp. VIII, 241. John Wiley & Sons, New York. 1906. Price, $2.00.

The value of a proper knowledge of the common apparatus used in scientific work as a prerequisite to the study of scientific principles and theories, is very often lost sight of. In the eagerness to acquaint the student with these principles, he is asked to make use of instruments, of the technique of the construction of which, and the determination of the accuracy of which he is entirely in the dark. Thus a beginning student is at once asked to determine the weight of a liter of chlorine, by means of a balance without having any knowledge of its essential points of construction, or of the conditions which determine is accuracy and sensibility. Again a student in botany, very often for years studies the most complex cell structure, without any knowiedge of the technique of the compound microscope or other instruments, which he uses daily.

We find, for example, students of several years experience, determining the melting points of substances, in order to illustrate some underlying principle, without any knowledge whatever of a method of determining the accuracy or delicacy of the thermometer used.

It is in this respect that the above mentioned book is to be especially recommended. Although it does not contain all that might be wished for as a text book for a course in laboratory technique, it yet contains many essential studies of physical and chemical apparatus, ordinarily unnoticed in the mass of material of the larger books on physics and physical chemistry.

The first four chapters are devoted to the subjects of the balance, volume and density, viscosity and solubility. In each case the principles of construction of the apparatus, the determination of its sensitiveness and its calibration are carefully considered. Under the head of Thermal measurements, the next three chapters, are devoted to a study of thermometry; melting and boiling point determinations; and calorimetry. These subjects are treated, again, merely from the standpoint of the technique of the apparatus used, without applications. In the same way the general subjects of optical measurements and dynamical measurements are taken up.

I. W. Brandel.

SYLLABUS DER PFLANZENFAMILIEN. A summary of the entire system of plants, with special notice of economic and medicinal plants, together with a synopsis of the flora and floral regions of the earth; for teachers and students of special and medicinal-pharmaceutical botany; by Dr. Adolf Engler, Professor of botany and Director of the botanical gardens and museums of Berlin. 4th ed., pp. 237, Geb. Borntraeger, Berlin. 4 M.

This new edition of the familiar and much used syllabus is deserving of none but favorable criticism. It is now in common use by students and teachers of systematic botany in all parts of the world. In it are given in a condensed and accessible form the system of Engler and Prantl, which is now in almost universal use.

Only a few minor changes have been made in this edition, principally in the arrangement of groups of the lower fungi.

The mechanical work is excellent and the book is deserving of a large sale. *R. H. D.*

A CRITICAL REVISION OF THE GENUS EUCALYPTUS; by J. H. Maiden, Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney. Part IV, pp. 65. 1904.

Two species, *E. incrassata* Labill and *E. faecunda* Schauer are described and figured in this part. The original description is given for each species, together with a complete synonomy, and an account of range and affinities.

This part is illustrated by twelve excellent plates showing leaf, flower and fruit forms. *R. H. D.*

DIE CHEMIE DER ZUCKERARTEN von Prof. Dr. Edmund O. von Lippmann. Dritte völlig umgearbeitete Auflage. Zwei Bde., pp. 2002. Verlag von Friedrich Vieweg und Sohn. Braunschweig, 1904. M. 30.00; geb. M. 34.00.

Since the early eighties of the past century the growth of the general literature on plantchemistry has been at a standstill, while the special literature has developed beyond all precedent. The literature on alkaloids, on ferments, on the volatile oils and the socalled terpenes has each developed into a small but respectable library. The chemistry of the sugars has developed no less. According to the author, the last revision, covering a period of ten years, necessitated the assimilation of a literature on the subject which was as large as that of the entire century which preceeded.

Not only will the busy sugar chemist, but chemists at large, technologists, bacteriologists and many others have cause to be thankful to the author for having digested for them the mass of detailed material and presented it in a form that makes it available to every one who has some understanding of organic chemistry. If one stops to consider that the subject of the chemistry of the sugars, viewed in its broadest aspects, touches analytical, physical, physiological, pathological and medical chemistry as well; that it is an important factor in the chemistry of food stuffs and beverages, in fermentology and the chemistry of enzymes, in bacteriology, animal and plant physiology, agriculture, the technology of sugars and the ferment industries, the manufacture of starch, the dairy industries etc.; if one further reflects that in each of these branches hosts of specialists are engaged in enlarging their respective fields, one may comprehend, in part at least, the magnitude of the undertaking. It seems almost like madness for one person to attempt the task of coordinating all the observed facts and speculations in so diversified a field. Yet, with the aid of colaborers it has been done and done well.

In as much as many pharmacists may not have kept abreast with the development of the chemistry of the sugars, a partial analysis of the subject matter may be of special interest to them. No doubt, some will be surprised to learn of the numerous substances that have been added to the cane sugar, the milk sugar, the glucose and fructose of their student days.

Monosaccharides or simple sugars. To these the first volume of 1034 pages is devoted.

Dioses: — Glycolose or glycolic aldehyde.

Trioses: — d, l and i-Glycerose; dioxyacetone; methyl-glycerose and trimethyl-triose.

Tetroses: — d, l and i-Erythrose, d and l-threose; d and i-erythrulose; methyl-tetrose, digitorose, apiose.

Pentoses: — d, l and i-Arabinose, d, l and i-xylose, d, l and i-ribose, cerasinose, prunose, traganthose, cyclamose; d and l-arabo-ketose, i-xylo-ketose, i-ribo-ketose, ketopentose from crude formose; metasaccharin-pentose, isosaccharin-ketopentose; fucose, rhamnose, isorhamnose, quinovase, rhodeose (d-fucose), isorhodeose, methylpentose from saponin, cyclamin etc., antiarose, methylpentoses from saccharin, urine, egg albumen, digitalose.

Hexoses: — d, l and i-glucose, d, l and i-mannose, d, l and i-gulose, d. l and i-idose, d, l and i-galactose, d, l and i-talose; chitose; d, l and i-fructose, d, l and i-sorbinose, pseudofructose, glutose, formose, d, l and i-tagatose, galtose; not less than nineteen hexoses of unknown constitution; four synthetic sugars; and two methyl hexoses.

Heptoses: — Two gluco-heptoses, three manno-heptoses, two gala-heptoses, chito-heptose, keto-α-manno-heptose, fructo-heptose, volemose, rhamno-heptose.

Octoses: — Two gluco-octoses, manno-octose, gala-octose, sorbo-(?)-octose; rhamno-octose.

Nonoses: — α-Gluco-nonose, d-manno-nonose.

A few pages of the first volume are also devoted to substances related to the sugars, including cyclic compounds the socalled cycloses. Among these are quercite, inosite, scyllite etc. The second volume takes up the polysaccharides, the disaccharides being classified in a similar manner as the simple sugars.

Derivatives of tetroses: — Glyco-apiose.

Derivatives of pentoses: Arabiose, galacto-arabinose, glyco-clycamose, manno-rhamnose.

Derivatives of hexoses: — Cane sugar, trehalose, turanose, gentiobiose, cellose, maltose, isomaltose, mannobiose, milk sugar or lactose, isolactose, melibiose, glucusido-galactose, galactosido-galactose, and nine dissaccharides of unknown components.

Derivatives of heptoses: — Galactosido-glycoheptose, glucosido-glucoheptose.

To these is also appended a group of substances related to the above, but not typical sugars. If one bears in mind the host of possibilities in the combination by condensation of any two simple sugars, it becomes apparent at once that the number of dissaccharides is apt to grow materially in the future. The trisaccharides, relatively few in number, are also classified according to the kinds of simple sugars which they yield upon hydrolysis. Two tetrasacharides are included in the special part of the treatise.

The names of some of the sugars enumerated above reveal their origin from medicinal plants or drugs. If one compare the above array of names with the designation "sugar" that occurs so often among the "constituents" in Maisch's "Materia medica," a standard text book only a few years ago, it becomes apparent what changes will have to be made in many of our pharmaceutical text-books in order to bring them up to date in so far as the sugars are concerned. Unfortunately for pharmacognosy, those plant chemists interested in the sugars have paid but little attention to medicinal plants or the drugs derived therefrom. Here is an excellent opportunity for a young investigator who is looking about for new fields to conquer.

The last third of the second volume is devoted to general considerations, such as constitution and synthesis, the optical problems involved, the origin of the sugars in the plant and their physiological significance.

Those who desire to use the treatise as a work of reference will be pleased to learn that not less than ninety pages of three columns each are devoted to an index. The authors' index contains no less than 3710 names, some with numerous references to pages.

Press work and paper are of the usual excellence of this well-known firm. While the book was being printed, additions were made in the form of a supplement. A table of references to these is given in the preface so that the user of the book can add the number of the page to the margin. A table of corrections for like use is supplied. All in all, the book is admirable in general conception and execution. That it will be greatly appreciated by many can not be doubted.

E. K.

APPLICATION OF SOME GENERAL REACTIONS TO THE INVESTIGATIONS OF ORGANIC CHEMISTRY. By Dr. **Lassar Cohn**, Professor of Chemistry at the University of Königsberg. Authorized translation by Dr. J. B. **Tingle**. One vol., pp. 101. John **Wiley & Sons**, New York, 1904. $1.00.

For any one who is at all familiar with the fundamental principles of organic chemistry, it is a matter of comparative ease to work-out new compounds on paper and to predict in a general way their properties. The real task begins in the laboratory with the study of the exact conditions most favorable to their formation.

With the tens of thousands of organic compounds which have been prepared within the last half century, one might expect that a systematic study of these conditions had been made by this time.. Such, however, is the case only in comparatively few instances.

How important the observation of the proper conditions becomes to the successful preparation of a compound may well be illustrated in connection with the manufacture of vanillin.

In 1876 Tiemann and Reiner succeeded in preparing vanillin artificially by the action of aqueous alkali on a mixture of chloroform and guaiacol. The yield at best did not exceed 5 percent, and large quantities of tarry matter were formed. The discoverers and others were then bent upon the study of the conditions that would secure a better yield. It was well known that alkalies readily convert aldehydes into resinous bodies. Traub, therefore, in 1896 suggested that the alkali be added gradually in small portions. Next the reaction was facilitated by the substitution of alcohol as a solvent for the water in which chloroform and the guaiacol are but sparingly soluble. Not only is the time of reaction thereby shortened but the resulting liquid is but barely yellow. The maximum quantity of guaiacol which could be transformed in one operation by the first method was 5 grams; by the modified process 10 Ko. may be readily operated on at once.

Insignificant as the changes may appear, their importance can not be overestimated. Moreover they are based on rational chemical thinking.

The book made available to American students by this translation makes no pretense at being a complete handbook covering the entire field. The substances and reactions selected for illustration are those familiar to most students of organic chemistry. Hence the lessons taught will appeal to him.

Lassar-Cohn has done much for the technique of chemistry by his recent publications. The importance of this subject has not only been overlooked by many but belittled. We welcome, therefore, this new literature on chemical technique because it will aid in the evolution of more rational chemical experimentation. The illustrations selected are exeedingly suggestive and the account is written in a very readable style though the English translation sometimes smacks of the orginal German. The book cannot be recommended too strongly for the use of students who have had a year of organic chemistry. Many teachers themselves may profit by a perusal of its contents. *E. K.*

QUANTITATIVE ANALYSIS BRIEF. By Allard Memminger, M. D. Second edition revised and rewritten. Net price one dollar. P. Blakiston's Son & Co., Philadelphia.

This "Brief" contains 118 pages, each alternate one a blank for notes by the student. The author in his preface to the first edition says: "This Brief I have written especially for my classes in Qualitative Analysis in the College of Pharmacy" of South Carolina. "To make more plain the methods of analysis has been my aim." This aim is certainly a most worthy one, but it is quite questionable if the author has succeeded in accomplishing his purpose. In the opinion of the reviewer the end sought would have been more surely attained by a half dozen pages of so-called "Analytical Tables" and which at their best would lead the student on in purely empirical methods.

The publishers have done their work well. The print and paper are good and the binding attractive. *W. W. Daniells.*

DAS ICHTHYOL, 400 bewährte Rechtsformeln für dessen Gebrauch. Dritte verbesserte Auflage. Brochure, pp. 107. 1903.

This booklet is intended primarily for physicians, but may prove useful to pharmacists as a reference for the various therapeutic combinations of ichthyol.

Four hundred prescriptions by one hundred and twenty-four physicians are classified under the various forms of disease against which ichthyol has been used as a remedy.

A few general directions follow, then an index of authors. The booklet is published by the Ichthyol-Gesellschaft Cordes, Hermanni & Co. of Hamburg. *E. K.*

Concentrated Nitrous Ether.

We manufacture a very superior article for the extemporaneous preparation of Sweet Spirit of Niter. 1 part of our Conc. Ether to 21 parts of Alcohol will produce a Spirit of Nitrous Ether answering the requirements of the U. S. P.

SPECIFY "M. C. W."

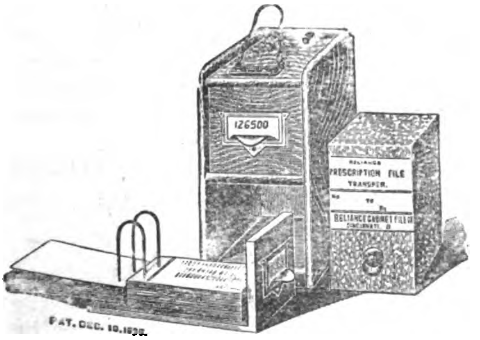
MALLINCKRODT CHEMICAL WORKS,
ST. LOUIS NEW YORK

Premo Cameras

produce perfect pictures with films or plates. Ask your dealer for a catalogue or send to us.

ROCHESTER OPTICAL CO.,
ROCHESTER, N. Y.

PRESCRIPTION FILE.
THE RELIANCE.



STYLE NO. 1.

Cabinet has perforator on top. Each drawer has our patented arch file. Capacity of each drawer is 500 prescriptions. File is quick and handy and saves time and labor in referring to old numbers. Transfer cases have removable arch wires. Capacity is 1,000 prescriptions. Send for testimonials and our catalogue of our line of druggists' filing devices and specialties.

THE RELIANCE CABINET FILE CO.,
Station B. Cincinnati, Ohio.

BLOCKI'S

IDEAL Perfumes IDEAL

Ilovit
Italian Violette
Boquet Carmen
Boquet du Barry
Naiad's Breath
Pearl of Persia
Psyche Rose
Regal Carnation
Regal Jockey Club
Regal Crabapple
Regal Peau d'Espagne
Regal Lilac
Regal Lilies of the Valley
Regal Frangipanni
Regal Heleotrope
Regal White Rose

High-Class Handkerchief Essences.

These odors are new and original and distinctly superior.

They are beautifully packaged and comprise altogether the most attractive and effective line on the market.

Prepared expressly for exclusive, critical trade. Quality is the first consideration in their manufacture, consequently they have already secured a large sale among the discriminating elite.

For samples, terms, etc., address,

JOHN BLOCKI & SON
56 Fifth Avenue, CHICAGO.

THE SCHOOL OF PHARMACY
OF THE
UNIVERSITY OF MICHIGAN.

LABORATORY METHOD.

The Register of the Alumni indicates the influence of laboratory method upon the character of the college student. The graduates, taken as a body, have been steadily at work since they left college, almost without interruption, except when prevented by sickness. As a rule they have continued in the calling they chose when they entered this University. In whatever business they have engaged, they have succeeded, with remarkably few exceptions, and have sustained commercial credit. They have been known for honorable character. They represent systematic industry. The influence of sustained scientific work, at once with the hand and with the mind, enforcing patience and truth, in the formative years, sets the pace for the pursuits of life. This claim for laboratory education can be made only for thorough graded courses of full time, and for those based upon substantial preparatory schooling.

DEMAND FOR OUR GRADUATES.

The number of graduates of this school who are wanted is every year many times greater than the supply. It is especially difficult to meet the large demand for persons qualified for the most congenial and remunerative positions. Most inviting opportunities are lost every year because of the scarcity of men qualifying for such positions.

The Register of Alumni will tell you what our graduates are doing. This and the annual catalogue will be sent on request. Address:

J. O. SCHLOTTERBECK, Sec'y, 1319 Israel Ave., Ann Arbor, Mich

UNIVERSITY OF WISCONSIN.

FOR CATALOGUE
AND OTHER INFORMATION
APPLY TO
PROF. EDWARD KREMERS,
MADISON, WIS.

General Chemical Laboratory.

RICHTER'S INORGANIC CHEMISTRY. 5th American translated from the 10th German edition; thoroughly revised. With many illustrations and colored plate. 12 mo. Cloth, net, $1.75.

"Notwithstanding the multitude of text-books on chemistry, there is always room for a good one, and the present work will undoubtedly fall under this head. Prof. von Richter's work met with great success abroad, owing to its unusual merit. In presenting the subject to the student, the author makes a point to bring out prominently the relations existing between fact and theory, too commonly considered apart. ...... The periodic system is so treated as to prove a really valuable aid to the student, and especially in the relations of the metals. ...... Von Richter's text-book deserves a hearty welcome at the hands of teachers of chemistry desirous of instructing in modern theories and on a rational basis."—*The Science Record.*

RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz, University of Bonn. 3rd American from the 8th German edition. With illustrations.

"The completion of this translation of Richter's standard treatise will undoubtedly be welcomed by all who do not read German or at least prefer the English to the German. In taking upon himself the arduous work of translating a treatise so full of detail, Professor Smith has earned the gratitude of all American chemical students. The two volumes will constitute a valuable if not an indispensable addition to every chemical library."—*Pharmaceutical Review*, 1900, p. 196.

P. BLAKISTON'S SON & CO., Philadelphia.

NOW READY. FIFTY-FOURTH YEAR

THE PHYSICIAN'S VISITING LIST FOR 1905

Will be sent by mail, postage prepaid, to any address upon receipt of price, or may be ordered through any Bookseller, News Agent, or Wholesale Druggist.

DESCRIPTIVE CIRCULAR FREE UPON APPLICATION.

SIZES AND PRICES.

Bound in Strong Leather Covers, with Pocket and Pencil, Gilt Edges.

REGULAR EDITION.

For 25	Patients weekly		$1.00
50	"	"	1.25
50	"	" 2 vols. Jan. to June July to Dec.	2.00
75	"	" 2 vols. Jan. to June July to Dec.	2.00
100	"	" 2 vols. Jan. to June July to Dec.	2.25

PERPETUAL EDITION, without dates.

No. 1. Containing space for over 1300 names. Bound in Red Leather . . . $1.25

No. 2. Same as No. 1. Containing space for 2600 names $1 50

MONTHLY EDITION, without dates.

☞ Requiring only one writing of patient's name for the whole month. Plain binding, without flap or Pencil. 75 cents; Leather cover, Pocket and Pencil, $1.00.

A plain, systematic method of keeping physicians' accounts,—pocket size, well printed, strongly bound, durable and convenient.

P. BLAKISTON'S SON & CO., 1012 WALNUT ST., PHILADELPHIA.

The Open Court

AN ILLUSTRATED MONTHLY MAGAZINE

Devoted to the Science of Religion, The Religion of Science and the Extension of the Religious Parliament Idea.

10 cents per copy - - - - - - - $1.00 per year

SCIENCE is slowly but surely transforming the world. Science is knowledge verified; it is Truth proved; and Truth will always conquer in the end. The power of Science is irresistible. Science is the still small voice; it is not profane, it is sacred; it is not human, it is superhuman; Science is a divine revelation.

Convinced of the religious significance of Science, *The Open Court* believes that there is a holiness in scientific truth which is not as yet recognized in its full significance either by scientists or religious leaders. The scientific spirit, if it but be a genuine devotion to Truth, contains a remedy for many ills; it leads the way of conservative progress and comes not to destroy but to fulfil.

The Open Court on the one hand is devoted to the *Science of Religion*; it investigates the religious problems in the domain of philosophy, psychology, and history; and on the other hand advocates the *Religion of Science*. It believes that Science can work out a reform within the Churches that will preserve of religion all that is true, and good, and wholesome. Sample copies of *The Open Court* sent on request together with illustrated catalogue of important publications for the Study of Religion. Published by

THE OPEN COURT PUBLISHING COMPANY, 324 Dearborn St., Chicago.

...Embossed colored...

Seals and Monograms,

LABELS OF ALL DESCRIPTIONS.

First Class Work a Specialty.

HERM. ENGELHARDT, Stettin.

Engraver, Printer and Manufacturer of Medals.

oles and Price list upon application.

Berlin-Porcelain-Haldenwanger

— from the —

PORCELAIN WORKS

W. HALDENWANGER, Charlottenburg,

can be obtained from all businesses, which deal in **Chemical** apparatus.

SUBJECT INDEX.

Page
A, The letter, in ph. lit. 435
Abietene 408
Acetic acid extracts 345
Albizzia saponaria 420
Alizarin bordeaux 416
Alkaloidal chemistry, Progress dur-during 1903 .... 167, 204, 256
Alkaloids, Reactions of cinchona .. 365
Aloes 447
American Pharmaceutical Association 41, 81, 121, 277, 317
Amyl nitrite 269
—— Assay of 440
Anethol 195
Anthra gallol 415
Anthra purpurin 416
Apothecary and the death dances 431, 435
Apothecary, Christ as 433, 435
Ash damiana 127
Assay, Citral, of vol. oils 15, 72
—— of formaldehyde 94
—— of drugs cont. oxymethylanthraquinone 447
Assistant pharmacists, Deficiency of 361
Association Am. Boards of Pharmacy 339
Atomic weights, International 86

Backhausia citriodora 15
Balsam copaiba 376
—— Oregon 293
Benzaldehyde 195
Book plates 435

Carvone 195
Chemical Exhibit 397
Chemistry, History of 5
Christ as apothecary 433, 435
Cinchona alkaloids, Reactions of 365, 446
Citral assay of vol. oils 15, 72
Codeine, Determ. of, in opium 348
Colleges and Schools 402, 455
Common salt mixture 435
Conference of Pharm. Faculties 337
Copaiba balsam 376

Damiana 126
Digger pine 408
Drugs of primitive peoples 241, 279
—— Examination of off 389
—— used by N. Am. Indians 300

Echinacea angustifolia, Hist. of ... 9
—— purpureum 11
Eucalyptol 196
Eucalyptus steigeriana 15
Eugenol 197
Ex libris 435
Exposition, La. Purchase 341, 397
Extracts, Acetic acid 345

Ferments in Monarda 193
Flavo purpurin 415
Formaldehyde, Assay of 94
Frangula 422, 425

Gas analysis 440, 445
German Chem. Exhibit 397
Guajene 60
Gurjunene 61

Heveene 62
History of Echinacea angustifolia. 9
—— of mat. med. etc. 5
Hoffmann, Fr. 48
Humulene 63

Indians, Drugs of N. Am. 300
International atomic weights 86

Journals, Pharmaceutical 353

Ledene 70
Legislation, Early, in Wis. 435
Legislation in N. Y. 31, 155, 198, 218, 436
Lemon oil 15
Lloyd Library, Founding of 357

Marinda citrifolia 420
Materia medica, History of 5
Medicine, History of 5
Menthol 197
Methyl salicylate 197
Meyer's blood purifyer 9
Mexican tea 126
Monarda citriodora 153
—— ferments 193
—— fistulosa 190

New York Coll. Pharm 163
—— Colleges 487
—— Legislation in ... 31, 155, 198, 218
New Remedies 231, 274
Nitroso carvacrol 248, 290

Ohio Board 488
Oil, Am. pine tar 150
—— of lemon 15
—— — Monarda citriodora 153
—— — mustard, vol. 96
—— — Oregon balsam 297
—— — santal 25
—— — sassafras 28
—— — thyme 215
—— — turpentine 146
Oils, The citral assay of vol. 15, 72
—— Sesquiterpenes in vol.—See sesquiterpenes.
Oleoresin. See Oregon balsam.
Opium, Determ. of codeine in 348
—— Cult. in U. S. 426
Oregon balsam 293
Oxymethyl anthraquinone, drugs containing 415, 447

Page
Papaver somniferum, Cult. in U. S. 426
Patchoulene 101
Patent medicine curse 161
Pharmacopoeia, Belgian 195
—— Swedish 195
—— U. S. See U. S. P.
Phytochemical notes 183, 293
Phytochemistry, The study of 355, 394, 462
Pinus coulteri 412
—— jeffreyi 408
—— — var. penninsulares 413
—— — var. montana 414
—— ponderosa 413
—— sabiniana 408
Potassium bi-iodate for stand. vol. sol. 371
Prerequisite clause 437
Purpuroxanthin 415

Quassia 420

Resin from Oregon balsam 299
Rhodiene 102
Rhubarb 415, 421
Rhamnus catharticus 415, 425
—— frangula 425
—— japonica 420
—— purshiana 425
Rheum collinianum 425
—— officinale 425
—— palmatum 425
Rice, Chas. 53, 161
Rumex acutus 420
—— hymenosepalus 420
—— obtusifolius 420

Sanadera 420
Santalene 102
Sargent, E. H. 201
Schools and colleges 402, 455
Senna 415, 422
—— — linaloe oil 134
Squibb, E. R. 45
Sesquiterpenes 60, 101
—— synthetic 139
Sesquiterpene from amyrol 110
—— — caryophyllene dihydrochloride 112
—— — santonin 137
Sesquiterpene of ageratum oil 110
—— — angelica root oil 111
—— — basilicum oil 111
—— — calamus oil 111
—— — carline thistle oil 111
—— — cascarilla oil 113
Page
—— — celery seed oil 113
—— — citronella oil 114
—— — copaiba balsam oil 115
—— — cubeb oil 131
—— — cypress oil 131
—— — Erechthites oil 131
—— — garlic oil 131
—— — hemlock needle oil 132
—— — hemp oil 132
—— — Kampferia galanga oil 133
—— — kesso root oil 133
—— — laurel berry oil 133
—— — lavender oil 134
—— — lemon oil 134
—— — linaloe oil 134
—— — long pepper oil 134
—— — Minjak-lagam balsam oil. 135
—— — peppermint oil 136
—— — pimenta oil 136
—— — poplar bud oil 137
—— — sage oil 137
—— — spike oil 138
—— — spiraea oil 138
—— — valerian oil 138
—— — vetiver oil 138
—— — wild thyme oil 138
Stearns & Co.'s book plate 436

Tar oil, Am. pine 150
Tea, Mexican 126
Tecoma ochracea 420
$\Delta^{1.4}$ Terpadiene-3-oxime-6-one. 248, 290
Trivalerylene 139
Turnera aphrodisiaca 126

United States Pharmacopoeia 1900. .... 25, 96, 146, 214, 269
United States Pharmacopoeia, History of present 43

Vetivene 140
Volatile oil constituents in Swed. and Belg. pharmacopoeias ... 195
Volatile oils, The citral assay of 15, 72
—— — The proposed, of the U. S. P. 1900 ...... 25, 96, 146, 214
—— — Sesquiterpenes in. See sesquiterpenes.
Viviana esculenta 420
Volumetric solutions, Standardization by means of pot. bi-iodate 371

Winterene 140

Zingiberene 141

Popular Fiction for the Holiday Season.

The following list embraces the prominent works of fiction in the season and those which will undoubtedly be the leading sellers:

Affair at the Inn, Kate Douglas Wiggin	$1.25
Abbess of Vlaye, Stanley J. Weyman	1.50
Bred in the Bone, Thomas Nelson Page	1.50
Black Friday, Fred. S. Isham	1.50
Belle of Bowling Green, Amelia E. Barr	1.50
Box of Matches, Hamblen Sears	1.50
Blazed Trail Stories, Stewart E. White	1.50
Brethren, H. Rider Haggard	1.50
Beverley of Graustark, George B. McCutcheon	1.50
Captains of the World, Gwendolen Overton	1.50
Common Lot, Robert Herrick	1.50
Cap'n Eri, Joseph Lincoln	1.50
Castaway, Hallie Erminie Rivers ... Net	1.00
Comrades in Arms, General Charles King	1.50
Cost, David Graham Phillips	1.50
Crossing, Winston Churchill	1.50
Chicago Princess, Robert E. Barr	1.50
Christmas Eve on Lonesome, John Fox, Jr.	1.50
Captain in the Ranks, Geo. C. Eggleston	1.50
Delightful Dodd, by Elliot Flower	1.50
Dogs Tale, Mark Twain	1.00
Double Harness, Anthony Hope	1.50
Evelyn Byrd, George Cary Eggleston	1.50
Four Roads to Paradise, Maude Wilder Goodwin	1.50
Farmington, Clarence S. Darrow	1.50
God's Good Man, Marie Corelli	1.50
Georgians, Will N. Harben	1.50
Green Diamond, Arthur Morrison	1.50
Heart of Happy Hollow, Paul Laurence Dunbar	1.50
Heart of Lady Anne, A. & E. Castle	1.50
House of Fulfilment, George M. Madden	1.50
Happy Average, Brand Whitlock	1.50
In the Bishops Carriage, Miriam Michelson	1.50
I'm from Missouri, Huge McHugh	.75
In the Closed Room, Frances Hodgson Burnett	1.50
Jewell's Story Book, Clara Louise Burnham	1.50
Kate of Kate Hall, Ellen T. Fowler & A. L. Felkin	1.50
Little Shepherd of Kingdom Come, John, Fox, Jr.	1.50
Little Citizens, Myra Kelly	1.50
Law of the Land, Emerson Hough	1.50
Last Hope, Henry Seton Merriman	1.50
Love of Azalia, Onoto Watanna ... Net	2.00
Love finds the Way, Paul Leicester Ford	2.00
Lady of Loyalty House, Justin H. McCarty	1.50
Ladder of Swords, Gilbert Parker	1.50
Loves of Edwy, Rose Cecil O'Neill	1.50
Madigans, Miriam Michelson	1.50
Memoirs of a Baby, Josephine Dodge Daskam	1.50
Millionaires Baby, Anna K. Green	1.50
Man on the Box, Harold MacGrath	1.50
Masquerader, Katherine Cecil Thurston	1.50
Masters Violin, Myrtle Reed ... Net	1.50
My Lady of the North, Randall Rarrish	1.50
Mountains, Stewart Edward White ... Net	1.50
Monarch, the Big Bear of Tallac, Ernest Thompson Seton ... Net	1.25
Nancy's Country Christmas, Elenor Hoyt	1.50
One Woman, Thomas Dixon, Jr	1.50
Old Gorgon Graham, G. H. Lorimer	1.50
Ode to Old Aunt Mary's, James Whitcomb Riley	2.00
Off the Highway, A. P. Smith	1.50
President, Alfred Henry Lewis	1.50
Prospector, Ralph Connor	1.50
Prodigal Son, Hall Caine	1.50
Queen's Quair, Maurice Hewlett	1.50
Rebecca of Sunnybrook Farm, Kate Douglas Wiggin	1.25
Rulers of Kings, Gertrudt Atherton	1.50
Rose of Old St. Louis, Mary Dillion	1.50
River's Children, Ruth McHenry Stuart	1.00
Roland of Altenburg, Edward Mott Woolley	1.50
Silent Places, Stewart Edward White	1.50
Sea Wolf, Jack London	1.50
Seeker, Harry Leon Wilson	$ 1.50
Son of Royal Langbrith, W. D. Howells	2.00
Singular Miss Smith, Mrs. Flo. M. Kingsley	1.25
Samantha at St. Louis Exposition, by Josiah Allen's Wife	1.50
Susan Clegg(by Anne Warner	1.00
Truants, A. E. W. Mason	1.50
Traffics and Discoveries, Rudyard Kipling	1.50
True Bills, George Ade	1.00
Undercurrent, Robert Grant	1.50
Vergilius, Irving Bachelor	1.35
When Wilderness Was King, Randall Parrish	1.50
Whosoever Shall Offend, F. Marion Crawford	1.50
Yoke, Elizabeth Miller	1.50
Youth of Washington, S. Weir Mitchell	1.50
Zelda Dameron, Meredith Nicholson	1.50

Andrea: the Tribulations of a Child. Karin Michaelis. Translated from the Danish by John Wilson Lourvik. 12mo, 143 pages	1.50
Beatrice of Venice. Max Pemberton. Illus. 12mo., 378 pages	1.50
Bethany: a Story of the Old South. Thomas E. Watson. Illus. 12mo, 383 pages	1.50
Custodian (The). Archibald Eyre. Illus. 12mo, 359 pages	1.50
Divine (The) Fire. May Sinclair. 12mo, 597 pages	1.50
Doctor Tom: the Coroner of Brett. John Williams Streeter. 12mo, 271 pages	1.50
Eagle's (The) Shadow. James Branch Cabell. Illus. 12mo, 256 pages	1.50
Farm (The) of the Dagger. Eden Phillpotts. Illus. 12mo, 297 pages	1.50
Flight (The) of a Moth. Emily Post. 12mo, 254 pages	1.50
Food (The) of Gods, and How it Came to Earth. H. G. Wells. 12mo, 329 pages	1.50
Genevra. Charles Marriott. 12mo, 313 pages	1.50
Hills (The) of Freedom. Joseph Sharts. Illus. 12mo, 296 pages	1.50
Jim Hickey: a Story of the One-Night Stands. George V. Hobart. Illus. 16mo, 119 pages	.75
Loves (The) of Miss Anne. S. R. Crockett. Frontispiece. 12mo, 421 pages	1.50
Mammy 'Mongst the Wild Nations of Europe. Ruthella Mary Bibbins. Illus. 12mo, 305 pages	1.50
May Iverson—Her Book. Elizabeth Jordan. Illus. 12mo, 282 pages	1.50
Players and Vagabonds. Viola Roseboro. 12mo, 344 pages	1.50
Prisoner (The) of Mademoiselle. Charles G. D. Roberts. 12mo, 265 pages	1.50
Queen's (The) Advocate. A. W. Marchmont. Illus. 12mo., 442 pages	1.50
Records (The). Cyrus Townsend Brady. Illus. 12mo, 321 pages	1.50
Sorrows (The) of Sap'ed: a Problem Story of the East. James Jeffrey Roche. Illus. 12mo, 195 pages	1.50
Staying (The) Guest. Carolyn Wells. Illus. 12mo, 282 pages	1.50
Sweet Peggy. Linnie Sarah Harris. Illus. 12mo, 279 pages	1.50
Theophano: the Crusade of the Tenth Century. Frederic Harrison. 12mo, 484 pages	1.50
Tommy & Co. Jerome K. Jerome. Illus. 12mo, 337 pages	1.50
Traitor and Loyalist; or, The Man Who Found His Country. Henry Kitchell Webster. Illus. 12mo, 318 pages	1.50

Remarque Edition of Literary Masterpieces.—Small flex leather, each $1.25.

Lord Chesterfield's Letters. Selections.
Rubaiyat of Omar Khayyam.
Milton. By Lord Macaulay.
Enoch Arden. By Alfred, Lord Tennyson.
Rip Van Winkle and The Legend of Sleepy Hollow. By Washington Irving.
Rochefoucauld's Maxims.
She Stoops to Conquer. By Oliver Goldsmith.
Old Christmas. By Washington Irving.
Vision of Sir Launfal. By James Russell Lowell.
Leaves of Grass. Selections. By Walt Whitman.
Elegy and Other Poems. By Thomas Gray.
Sweetness and Light. By Matthew Arnold.
Golden Thoughts. By Archbishop Fenelon.
Wit and Wisdom. By Sidney Smith.
A Christmas Carol. By Charles Dickens.

Send your orders to:

GEO. BRUMDER, Bookseller and Stationer,
MILWAUKEE, WIS.

☞ Kindly add 10% for postage on books, marked "Net."

The Dispensing Pharmacist Now a Manufacturing Perfumer

By the use of our **Absolute Essences and Floral Essences** all the famous French odors can now be perfectly reproduced at ⅛ to ½ present cost, equaling these in elegance, delicacy of bouquet and lasting fragrance.

PERFECT RESULTS and LARGE PROFITS ASSURED

No stock of essential oils or other ingredients is required. Loss by depreciation or error is impossible.
Send for our booklet telling all about this very promising and profitable addition to your business—giving prices and facsimile of letters recently received from a few of the thousand prominent druggists who now use **Absolute and Floral Essences.**

IT PAYS THEM *IT WILL PAY YOU*

LEHN & FINK,
120 WILLIAM ST. **NEW YORK**

FORMIN. Hexamethylene-tetramine Merck. Presents this ideal urinary antiseptic in its highest obtainable purity. In powder form, or *preferably* in Merck's 5 and 7½-grn. tablets.

CREOLIN-PEARSON is a safe, efficient and positive disinfectant. Used the world over. Beware of imitations, which are poisonous and at the same time possess less disinfectant power. See that the signature of MERCK & CO. is on the label.

GADUOL. The United States Dispensatory thinks it probable that the real virtues of cod-liver oil reside in an active principle or principles. Gaduol is the alcoholic extract of the active principles of cod-liver oil. It produces a stimulant and alterative effect on the processes of nutrition and absorption, and does not disturb the appetite or affect the stomach. A wine of cod-liver oil prepared from Gaduol is a favorite tonic and has a large sale wherever introduced. Let us send you valuable formulas.

MILK SUGAR is an indispensable ingredient in the diet of many babies. It should be free from all impurity and adulteration. MILK SUGAR MERCK is of the highest purity and fineness. Specify: MERCK

Merck & Co., New York.

Further information on application.